

# CIAIAC

COMISIÓN DE  
INVESTIGACIÓN  
DE **A**CCIDENTES  
E **I**NCIDENTES DE  
**A**VIACIÓN **C**IVIL

## Report IN-015/2014

Incident on 5 July 2014,  
involving an AIRBUS 340-300,  
registration LV-FPV, operated  
by Aerolíneas Argentinas, and  
a BOEING 767-300, registration  
VQ-BSX, operated by Utair, at  
the Barcelona Airport (Spain)



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SUBSECRETARÍA

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DE ACCIDENTES E INCIDENTES  
DE AVIACIÓN CIVIL

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## **Foreword**

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

In accordance with the provisions in Article 5.4.1 of Annex 13 of the International Civil Aviation Convention; and with articles 5.5 of Regulation (UE) n.º 996/2010, of the European Parliament and the Council, of 20 October 2010; Article 15 of Law 21/2003 on Air Safety and articles 1, 4 and 21.2 of Regulation 389/1998, this investigation is exclusively of a technical nature, and its objective is the prevention of future civil aviation accidents and incidents by issuing, if necessary, safety recommendations to prevent from their reoccurrence. The investigation is not pointed to establish blame or liability whatsoever, and it's not prejudging the possible decision taken by the judicial authorities. Therefore, and according to above norms and regulations, the investigation was carried out using procedures not necessarily subject to the guarantees and rights usually used for the evidences in a judicial process.

Consequently, any use of this report for purposes other than that of preventing 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

00 °C	Degrees centigrade
A-CDM	Airport Collaborative Decision Making. Program to optimize flight planning by improving air traffic management and sharing information between Eurocontrol, the airlines, handling companies, air navigation service providers and airports
ACC	Active Clearance Control
ACS	Area control surveillance rating
ADI	Aerodrome control instrument rating
AEMET	Spain's National Weather Agency
AENA	Spanish Air Navigation Services Provider
AESA	Spain's National Aviation Safety Agency
ANAC	Argentine National Civil Aviation Administration
AIP	Aeronautical Information Publication
AIR	Air control endorsement on air traffic controller license
APS	Approach control surveillance rating
ATC	Air Traffic Control
ATIS	Automatic Terminal Information System
ATPL(A)	Airline Transport Pilot License (Airplane)
CATCL	Community Air Traffic Controller License
CIAIAC	Comisión de Investigación de Accidentes e Incidentes de Aviación Civil (Spanish AIB)
CLR	Clearance
CN	Control North
ELR	No preferred daytime configuration at the Barcelona Airport (Spain)
ENR	Preferred nighttime configuration at the Barcelona Airport (Spain)
EOBT	Estimated Off-Block Time
ETOT	Estimated Takeoff Time
ft	Feet
GMC	Ground movement control endorsement
GEMS	General Error Modeling System
GMS	Ground movement surveillance endorsement
GND C	Central Ground Control Service
GND CN	Central and North Ground Control Service
GND N	North Ground Control Service
GND S	South Ground Control Service
GTRR	Noise Technical Working Group
h	Hour(s)
hPa	Hectopascal
ICAO	International Civil Aviation Organization
ILS	Instrument landing system
kg	Kilogram(s)
km/h	Kilometers per hour
KN	KiloNewton
LC GND	Taxi Control Service and Local Control Service
LCL	Local Control Service
LEBL	Barcelona – El Prat Airport (Spain)
LEMG	Málaga Airport (Spain)
LEMD	Madrid Barajas Adolfo Suárez Airport (Spain)
m	Meter(s)
MHz	Megahertz(s)
PICT	Integrated Post Control Tower
QNH	Atmospheric pressure at sea level
RAD	Radar endorsement on air traffic controller license
S	South
SACTA	Automatic Air Traffic Control System

## **Abbreviations**

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SAEZ	ICAO code for the Buenos Aires Airport (Argentina)
SHELL	Software, hardware, environmental, liveware and liveware interactive system
SMP	Command and display system
TCL	Terminal control endorsement on air traffic controller license
TWR-E	East Control Tower
TWR-S	South Control Tower
UTC	Coordinated Universal Time
WLL	Non-preferred nighttime configuration at the Barcelona Airport (Spain)
WRL	Preferred daytime configuration at the Barcelona Airport (Spain)

## Synopsis

### Aircraft 1

Owner and operator:	Aerolíneas Argentinas
Aircraft:	Airbus 340-300
Persons onboard:	141; no injuries reported
Type of flight:	Commercial aviation – Passenger transport – Scheduled – International
Phase of flight:	Taxi

### Aircraft 2

Owner and operator:	Utair
Aircraft:	Boeing 767-300
Persons onboard:	348; no injuries reported
Type of flight:	Commercial aviation – Passenger transport – Scheduled – International
Phase of flight:	Final approach

Date and time of incident: Saturday, 5 July 2014; at 06:52 local time<sup>1</sup>

Site of incident: El Prat Airport (Barcelona, Spain)

Date of approval: 26 October 2015

### Summary of incident

The BOEING 767-300, operated by UTAIR, was on final approach for landing on runway 02 at the Barcelona Airport (LEBL). At the same time, an AIRBUS 340-300, operated by Aerolíneas Argentinas, was crossing runway 02 where it intersects taxiway M, en route to the holding point for runway 25R for takeoff.

When the crew of the BOEING detected the presence of the other aircraft, they decided to go around. The AIRBUS 340 took off normally minutes later and reached its destination without incident. The BOEING 767 landed after circling the aerodrome.

The investigation has concluded that the incident was caused by a series of mistakes made at the various control stations that were not detected in time due to a lack of coordination. These mistakes occurred in the instants leading up to the daily runway

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<sup>1</sup> Unless otherwise specified, all times in this report are local. To obtain UTC, subtract two hours from local time.

configuration change that takes place at 07:00, when the airport transitions from the nighttime to a daytime configuration.

Contributing to the incident is the fact that the airplane with callsign ARG1163 had its flight scheduled at a time different from its usual departure time, and that the takeoff was from a non-preferred runway, which forced it to cross the active runway three times.

No safety recommendations are issued because during the investigation, both AENA and ENAIRE implemented various measures that addressed certain deficiencies that were detected and that may have resulted in the issuance of a safety recommendation.

## 1. FACTUAL INFORMATION

### 1.1. History of the flight

On 5 July 2014, at 06:20, the crew of the Airbus 340-300 operated by Aerolineas Argentinas, with callsign ARG1163 and parked at stand 270, contacted ground control on 122.225 MHz to request information and obtain clearance for engine start-up.

At that time the airport was in the preferred nighttime configuration (ENR), with landings taking place on runway 02 and takeoffs on runway 07R. At 06:20 the crew contacted ATC, which asked the crew if they needed runway 07L due to its greater length, to which the crew replied in the affirmative.

At 06:39 the crew began the start-up sequence and at 06:40 they were informed that the runway in use would be 07R.

At 06:43 they started taxiing to the 07L threshold via taxiways NS, K and D. The first officer was the pilot flying.

At 06:46, as they were taxiing on taxiway D, specifically between points D1 and D2, they were informed they would have to take off from runway 25R.

At that point the captain took over the controls so the first officer could enter the change into the Flight Management System.



Figure 1. Taxi route of airplane ARG1163

At 06:47, while they were taxiing on taxiway D, they were cleared to cross runway 02.

At 06:49, the controller asked them to cross runway 02 without stopping, to then turn right onto taxiway M and to stop at holding point M5.

At the same time, the crew of the Boeing 767-300, operated by UTAIR and with callsign UTA5187, contacted approach control on 118.1 MHz, which cleared it to continue its approach to runway 02. One minute later, at 06:50, they were cleared to land.

Also at 06:50, the crew of aircraft ARG1163 were cleared to cross runway 02 where it intersects taxiway M, so as to continue taxiing to the holding point for runway 25R. At 06:52, the crew called to confirm they could cross the runway, and they were again cleared to do so.

At that point (same time), airplane UTA5187 executed a go-around maneuver, its crew reporting this to ATC, which ATC acknowledged.

At 06:55, a EUROTRANS airplane with callsign BCS6304, which was on approach behind the UTA5187 and which was the last scheduled arrival in the nighttime configuration, landed normally on runway 02.

The minimum horizontal distance separating ARG1163 and UTA5187 during the runway incursion was 1.15 NM, and the minimum vertical distance was 200 ft (Figure 2). At that point aircraft BCS6304 was 4 NM behind UTA5187.

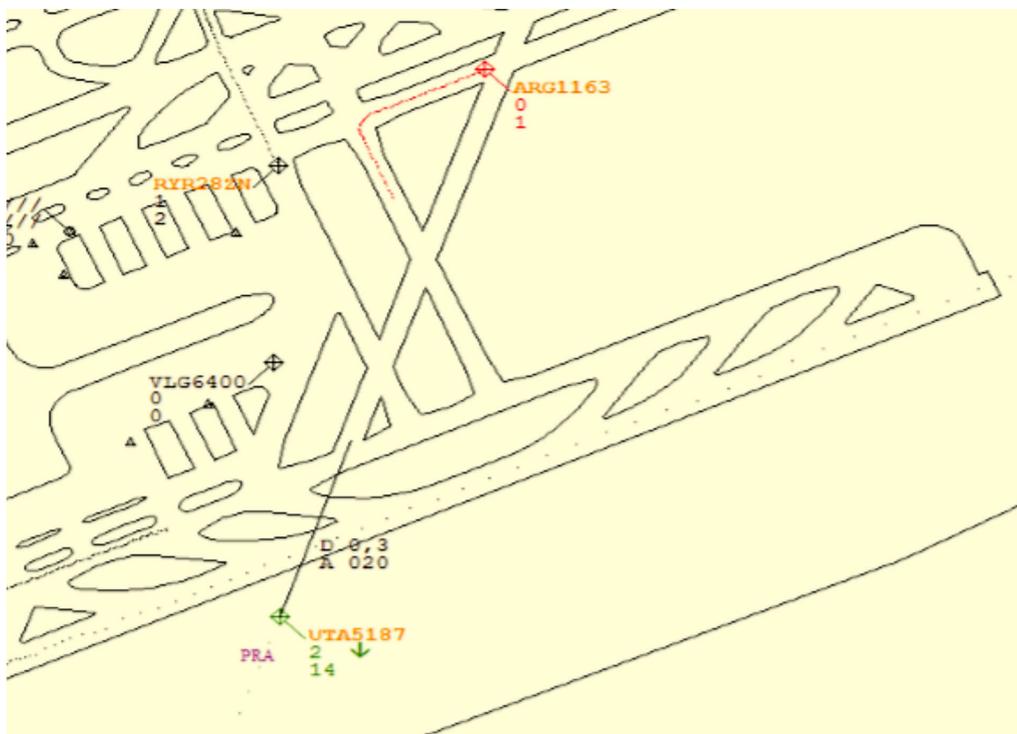


Figure 2. Minimum radar separation between the aircraft



Figure 3. Photographs of the runway incursion sequence

At 07:00, the airport's configuration was changed to daytime preferred (WRL), in which airplanes land on runway 25R and take off from runway 25L. Seconds later ARG1163 took off normally from runway 25R<sup>2</sup>.

At 07:08, UTA5187 landed on runway 02.

The sequence of photographs in Figure 3<sup>3</sup> shows the relative positions of the two aircraft as seen from the runway 02 extension.

## 1.2. Injuries to persons

### 1.2.1. Airbus 340-300

Injuries	Crew	Passengers	Total in the aircraft	Others
Fatal				
Serious				
Minor				Not applicable
None	12	336	348	Not applicable
<b>TOTAL</b>	<b>12</b>	<b>336</b>	<b>348</b>	

### 1.2.2. Boeing 767-300

Injuries	Crew	Passengers	Total in the aircraft	Others
Fatal				
Serious				
Minor				Not applicable
None	13	128	141	Not applicable
<b>TOTAL</b>	<b>13</b>	<b>128</b>	<b>141</b>	

## 1.3. Damage to aircraft

Neither aircraft suffered any damage.

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<sup>2</sup> The takeoff from runway 25R was required for aircraft performance reasons and authorized by ATC.

<sup>3</sup> This sequence of photographs was taken by a person who was on the runway 02 extension. It was published in the press and social media.

## 1.4. Other damage

There was no other damage.

## 1.5. Personnel information

### 1.5.1. Crew of the Airbus 340-300

The captain, 52, had an airline transport pilot license (ATPL(A)) and a total of 17,376 flight hours, of which 966 had been on the type. His license expired on 24 July 2014 and his class 1 medical certificate on 30 September 2014.

The first officer, 38, had an airline transport pilot license (ATPL(A)) and a total of 3,831 flight hours, of which 885 had been on the type. His license expired on 19 July 2014 and his class 1 medical certificate on 30 April 2015.

The third pilot, 34, had an airline transport pilot license (ATPL(A)) and a total of 4,787 flight hours, of which 2,766 had been on the type. His license expired on 24 July 2014 and his class 1 medical certificate on 30 September 2014.

The fourth pilot, 43, had an airline transport pilot license (ATPL(A)) and a total of 5,560 flight hours, of which 1,163 had been on the type. His license expired on the day of the incident, that is, 5 July 2014 and his class 1 medical certificate on 28 February 2015.

All of the flight crew licenses and the corresponding medical certificates had been issued by Argentina's Civil Aviation Authority and they were all valid and in force.

### 1.5.2. Crew of the Boeing 767-300

The captain, 49, had an airline transport pilot license (ATPL(A)) and a total of 13,500 flight hours, of which 4,163 had been on the type, 1,977 as captain. His license and class 1 medical certificate expired on 13 December 2014.

The first officer, 55, had an airline transport pilot license (ATPL(A)) and a total of 9,938 flight hours, of which 3,724 had been on the type, 153 as captain. His license and class 1 medical certificate expired on 19 September 2014.

The third pilot, 52, had an airline transport pilot license (ATPL(A)) and a total of 5,756 flight hours, of which 4,125 had been on the type. His license expired on 29 May 2015 and his class 1 medical certificate on 30 September 2014.

The fourth pilot, 42, had an airline transport pilot license (ATPL(A)) and a total of 2,173 flight hours, all of which had been on the type. His license and class 1 medical certificate expired on 4 April 2015.

All of the flight crew licenses and the corresponding medical certificates had been issued by Russia's Civil Aviation Authority and they were all valid and in force.

### 1.5.3. *Controllers on duty*

All of the controllers on duty at the time of the incident had a community air traffic controller license (CATCL) and an aerodrome control instrument (ADI) rating with the following endorsements: control tower (TWR), ground movement control (GMC), ground movement surveillance (GMS), air control (AIR) and aerodrome radar control (RAD).

They also had approach control surveillance (APS) ratings with radar (RAD) and terminal control (TCL) ratings.

Their licenses, ratings and corresponding medical certificates had been issued by Spain's National Aviation Safety Agency (AESA) and they were all valid and in force.

#### **Supervisor in the main (East) tower**

The supervisor was 55 years old. In addition to the above ratings, she also had an area control surveillance (ACS) rating with radar (RAD) and terminal control (TCL) endorsements.

All of her ratings expired on 16 October 2014 and her medical certificate on 11 December 2014.

She had level 6 in Spanish<sup>4</sup> and level 4 in English in her language proficiency endorsement, which expired on 13 June 2015.

She had 22 years of experience, 12 of them as a supervisor. She had been assigned to the Barcelona Airport tower for 10 years.

#### **South ground controller in the main (East) tower**

The South Ground controller was 37. All of her ratings expired on 19 October 2014 and her medical certificate on 8 April 2016.

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<sup>4</sup> The maximum language endorsement level does not expire for native speakers.

She had level 6 in Spanish and level 5 in English in her language proficiency endorsement, which expired on 12 February 2019.

She had 7 years of experience and had previously been at the Pamplona Airport tower for 4 years and at the Sabadell Airport tower for 6 months. She had been stationed at the Barcelona Airport tower since November 2010.

### **Local (landings and takeoffs) controller in the main (East) tower**

The controller in the local (landings and takeoffs in the nighttime configuration) post was 44. He also had an area control surveillance (ACS) rating with radar (RAD) and terminal control (TCL) endorsements.

All of his ratings expired on 16 November 2014 and his medical certificate on 25 July 2014.

He had level 6 in Spanish and level 5 in English in his language proficiency endorsement, which expired on 16 May 2019.

He had 14 years of experience, 4 of them at the Barcelona Airport tower.

### **North ground controller in the South tower**

The north ground controller was 37 and had an area control surveillance (ACS) rating with radar (RAD) and terminal control (TCL) endorsements.

All of her ratings expired on 16 June 2015 and her medical certificate on 19 December 2015.

She had level 6 in Spanish and level 5 in English in her language proficiency endorsement, which expired on 12 February 2019.

She had been at the Barcelona Airport tower for five years. It was her first assignment.

### **Central ground controller in the South tower<sup>5</sup>**

The central ground controller, who was in the south tower, was 38 and had an area control surveillance (ACS) rating with radar (RAD) and terminal control (TCL) endorsements.

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<sup>5</sup> This controller went on duty minutes before the incident to relieve his colleague at the north ground post.

All of his ratings expired on 19 April 2015, and his medical certificate on 12 December 2015.

He had level 6 in Spanish and level 5 in English in his language proficiency endorsement, which expired on 12 February 2015.

He too had been at the Barcelona Airport tower for five years. It was his first assignment.

## **1.6. Aircraft information**

### **1.6.1. Airbus 340-300**

The Airbus A-340-300 is a heavy turbulence transport airplane that is 63.69 m long and 16.91 m high, with a 60.30-m wingspan. The incident model, registration LV-FPV, was manufactured with serial number 193 and it had a standard certificate of airworthiness issued by Argentina's Civil Aviation Administration (ANAC) on 21 October 2013, pursuant to Type Certificate AV.0102 Rev. 02.

It had a maximum takeoff weight of 190,000 kg and it was outfitted with four CFM56-5C4/P engines, which produced a thrust of 151 KN each.

Its last (basic) maintenance inspection had been on 19 June 2014.

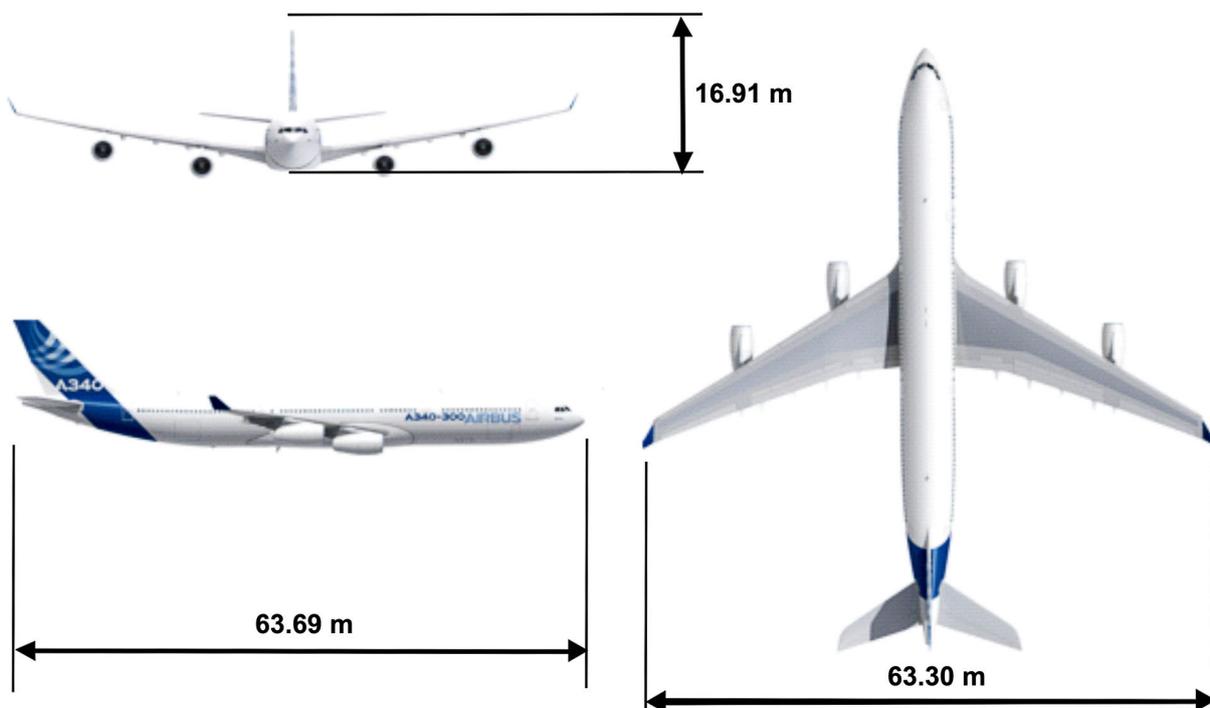


Figure 4. Dimensions of the Airbus A-340-300

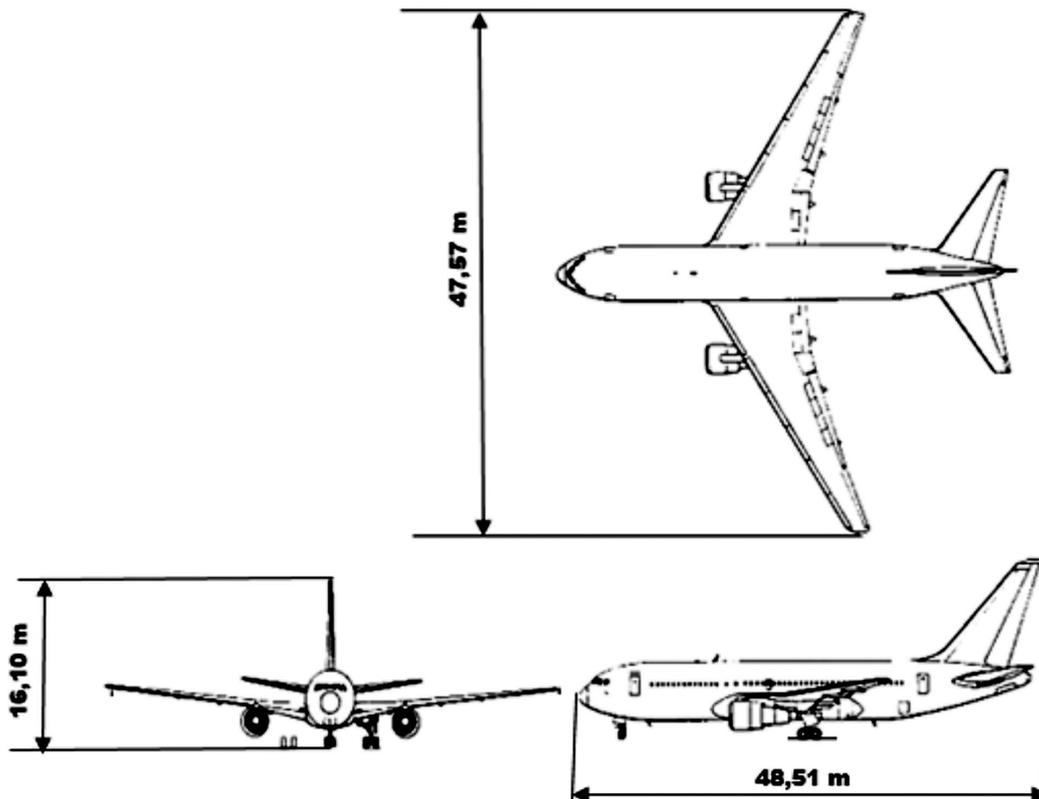


Figure 5. Dimensions of the Boeing B-767-300

### 1.6.2. *Boeing B-767-300*

The Boeing B-767-300 is a heavy turbulence transport airplane that is 48.514 m long and 16.104 m high, with a 47.574-m wingspan. The incident model, registration VQ-BSX, was manufactured with serial number 27612 and it had a valid certificate of airworthiness, no. 1887, issued by Russia's Civil Aviation Authority on 17 April 2014. It expired on 16 April 2015.

It had a maximum takeoff weight of 158,760 kg and it was outfitted with two CF6-80C2-B6F engines, serial numbers 704425 and 704274, which produced a thrust of 263 KN each.

Its last (basic) maintenance inspection had been on 26 June 2014, after which it had flown 105 h and made 28 landings. Its last line inspection had been on 3 July 2014.

## 1.7. Meteorological information

Spain's national weather service (AEMET) reported that the skies were clear throughout the Iberian Peninsula, except for the Bay of Biscay area. Specifically, the skies over Catalonia were clear.

At the Barcelona Airport visibility was good and there were few clouds. The temperature was 20 °C, QNH was 1,016 hPa, the relative humidity was 75% and there were light winds from 330° at 12 km/h.

### 1.8. Aids to navigation

Not applicable to this case.

### 1.9. Communications

The table below provides a summary of the communications between the airplanes and ATC:

Time	Channel	Station	Summary of message contents
06:20:53	72	ARG1163	ARG1163 contacts ATC.
06:21:04	72	121.8	ATC asks if they need runway 07L.
06:21:09	72	ARG1163	Crew confirm they do.
06:21:12	72	121.8	ATC confirms runway 07L and gives instructions.
06:21:45	72	121.8	ATC asks ARG1163 to call back when ready for start-up.
06:37:35	72	ARG1163	Calls to request start-up clearance.
06:37:42	72	121.8	ATC issues start-up clearance.
06:39:00	71	ARG1163	Reports push-back from stand 270.
06:39:09	71	122.225	Confirms clearance again and asks them to face west.
06:40:21	26	LC GND CN 121.7/121/65	CN ground asks S ground if it will go to runway 25L or 25R.
06:40:43	26	LC GND CN 121.7/121/65	S ground reminds CN ground to handle ARG1163 and that the configuration is changing at 07:00.
06:41:20	28	LC GND S 122.225	Confirms that initially it is going to 07L.
06:41:53	28	LC (SUPERVISOR)	The supervisor tells CN ground that ARG1163 will go fast but that it will be delayed later. The message is not very clear.
06:42:05	28	LC (SUPERVISOR)	Tell him to have it cross runway 25 and that there are no arrivals.
06:45:48	28	LC GND S 122.225	South ground confirms to CN ground that it will taxi on D and take off from 25R.
06:46:03	26	LC GND CN 121.7/121/65	CN ground asks if the ENR configuration is still in effect.

Time	Channel	Station	Summary of message contents
06:46:07	28	LC (SUPERVISOR)	Confirms and says to put it on non-preferred takeoff. Also tells him that the EUROTRANS will be the last one and that it is close.
06:46:52	71	122.225	ARG1163 informed that it will depart from 25R.
06:47:00	71	122.225	Takeoff from 25R confirmed and takeoff instructions given.
06:47:28	71	122.225	ARG1163 instructed to continue on K, cross runway 02 and D again, then hold short of 02.
06:49:01	69	UTA5187	Contacts Control.
06:49:06	69	118.1	Instructs it to continue approach runway 02 and will call back.
06:49:19	71	122.225	ARG1163 told not to stop, that it is cleared to cross runway 02 and continue and hold short of M.
06:49:30	71	ARG1163	Acknowledges.
06:49:34		LC GND S 122.225	S Ground informs C Ground that it is handing off ARG1163 short of M. At that time the GN+GC post is divided into two, GN and GC.
06:49:58	32	LC GND S 122.225	C Ground confirms and informs the other station they had cut out for a second.
06:50:50	77	ARG1163	ARG1163 reports it is close to taxiway M.
06:50:58	77	121.650	Tells ARG1163 to turn right on M, cross runway 02 and hold short of runway 25R holding point.
06:52:02	77	ARG1163	ARG1163 asks: Confirm ARG1163 can cross runway 02?
06:52:14	77	121.650	Replies: You can continue.
06:52:16	77	ARG1163	Acknowledges.
06:52:48	69	UTA5187	Announces go around.
06:52:56	69	118.1	Replies: UTA5187 copied, continue the standard procedure.
06:53:03	69	UTA5187	Acknowledges: Continue standard procedure UTA5187.
06:53:19	33	Aproximación	Conversation between the supervisor and Local controller informing of an oversight and that ARG1163 crossed the runway by mistake.
06:53:23	69	118.1	Informs VLG aircraft at the 07R threshold to wait and will notify it and clears EUROTRANS BCS6304 to land on runway 02, reporting a wind from 330 at 12.

### 1.10. Aerodrome information

#### 1.10.1. General information

The Barcelona Airport (LEBL) has three runways, designated 02/20, 07L/25R and 07R/25L. The first two intersect (see photograph in Figure 4)<sup>6</sup>. All three are 45 m wide.

Runway 02/20 is 2,645 m long, runway 07L/25R is 3,472 m long and runway 07R/25L is 2,780 m long.

Runway 02 has a Cat I<sup>7</sup> ILS and the other two (07L/25R and 07R/25L) have a category II/III<sup>8</sup> ILS.

Runway 20 (which is not used) does not allow for ILS precision approaches.

For environmental reasons directly related to noise pollution, the airport uses two different configurations, one during daytime hours (from 07:00 until 23:00) and another at nighttime (from 23:00 until 07:00).

The most typical preferred daytime configuration (West) is known as WRL, in which airplanes land on runway 25R and take off from 25L; in other words, runway 25R/07L, which is the longest, is used for landings in the WRL (preferred daytime) configuration, instead of being used for takeoffs. This forces the airport to have specific procedures to accommodate those aircraft for which runway 07R/25L is not long enough for takeoffs.

The non-preferred daytime configuration (East) is called ELR and uses runway 07L for landings and 07R for takeoffs.

The preferred nighttime configuration (North) typically used is called ENR. In this configuration traffic lands on runway 02 and takes off from 07R.

The other, non-preferred, nighttime configuration (West) is WLL and it uses runway 25L for both takeoffs and landings.

There are aircraft that, for performance reasons, request to take off from the longest runway (07L/25R). This is described in a procedure in an ENAIRE Aeronautical Information Publication (AIP).

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<sup>6</sup> Image taken from Google Earth.

<sup>7</sup> Category I has a decision altitude of no less than 200 ft and a runway visual range in the impact zone of no less than 550 m.

<sup>8</sup> Categories II/III are more restrictive.



Figure 6. Aerial view of the airport

All of the possible configurations are shown in the table below:

Configuration	Landings	Takeoffs	Remarks
WRL	25 R	25 L	Preferred daytime configuration (most typical).
ELR	07 L	07 R	Preferred daytime configuration.
ENR	02	07 R	Preferred nighttime configuration (most typical).
WLL	25 L	25 L	Preferred nighttime configuration.
ELL	07 L	07 L	Only used in duly authorized cases.
ELS	07 L	20	Used exceptionally.
ENL	02	07 L	Only in duly authorized cases.
ENN	02	02	Used exceptionally.
ERR	07 R	07 R	Used exceptionally.
WLS	25 L	20	Used exceptionally.
WRS	25 R	20	Used when runway 25L is closed.
WRR	25 R	25 R	Only in duly authorized cases.

1.10.2. Information on the control tower at the Barcelona Airport

The control tower at the Barcelona Airport<sup>9</sup> is divided into two stations, the main tower (East) and the auxiliary tower (South).

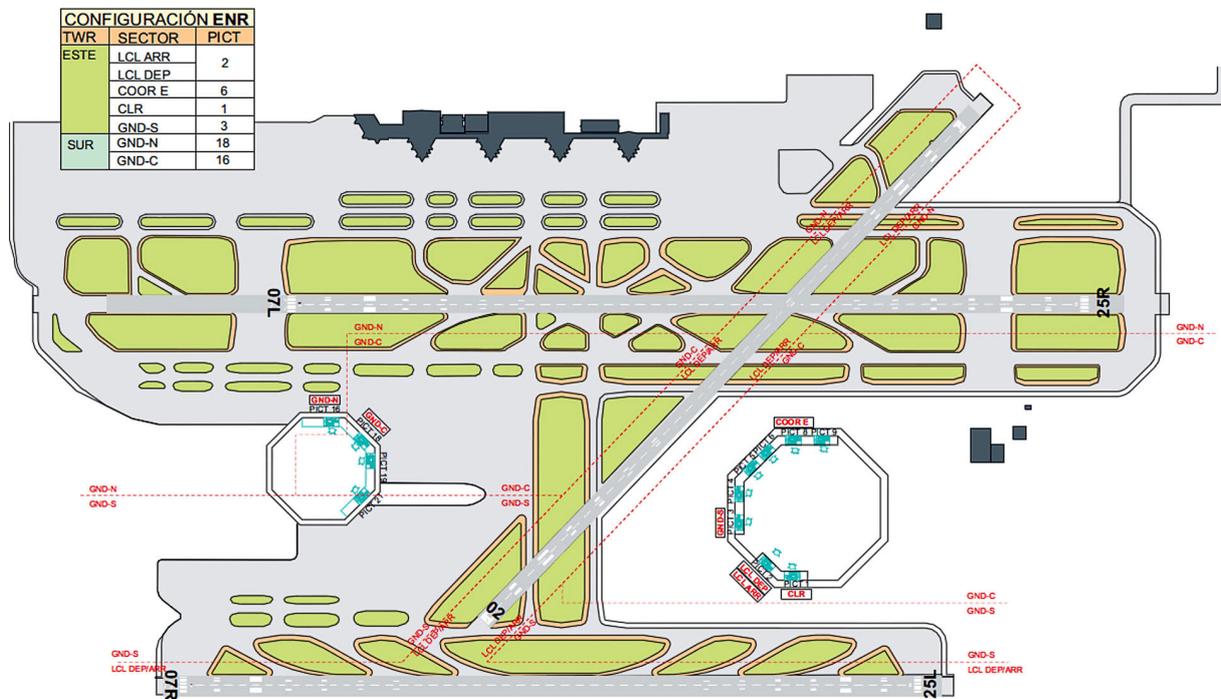


Figure 7. Location of the towers

In the maximum staffing configuration, the North Ground (GND-N) and Central Ground (GND-C) duties are handled from the South tower (TWR-S) by two different controllers, while the remaining posts are located in the East tower (TWR-E). Those posts are South Ground (GND-S) and Local (LCL), which authorize takeoffs and landings. There is also a post for Clearance Delivery (CLR). The duty supervisor stands watch in the TWR-E.

The posts in the tower in the ENR configuration, which was the one in use at the time of the incident, are arranged as follows:

<sup>9</sup> As indicated in the 2013 ENAIRE report, the control tower at the Barcelona Airport handled over 300,000 movements that year.

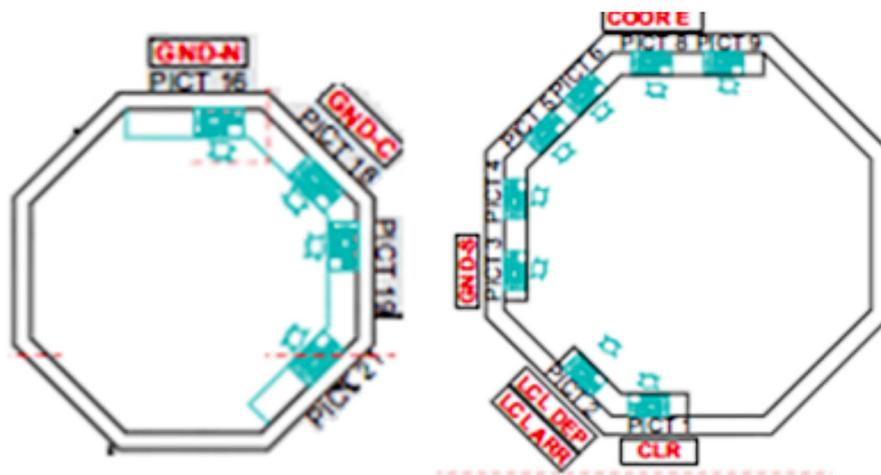


Figure 8. Layout of the posts in the towers

The GND-N and GND-C controller posts face north, meaning that traffic approaching runway 02 is behind them. Moreover, when seated, the GC controller cannot turn and see approaching traffic to 02 as far as the coastline. This controller also has the tower supervisor's tables directly behind, partially blocking their view. The Local controller's (LCL) post faces the intersection of runways 02 and 07R.

In the nighttime configuration, the GND-N and GND-C posts are combined into a single work post, GND-CN, which is manned by one controller. The coordination needed between the two towers to change configurations takes place shortly before the GND-C and GND-N duties are split.

The controller who was going to open and occupy the GND-C post went on duty minutes before the event and sectorized his own post without first receiving any operational information on the airport. This sectorization is usually made by the supervisor in the E TWR from the PSI post located in said tower for this purpose.

To avoid possible traffic incursions on runway 02, the M-5 stop bar lights are always on in the ENR configuration, even when runway 02 is not in service in the WRL configuration, to protect runway 25R. As a result, turning these lights off is part of the non-preferred taxi procedure to the 25R threshold. The LCL controller in the ENR configuration has to turn to see all of runway 02. Thus, the controller, who was focused on separating arriving traffic on 02 and departing traffic on 07R, was unable to see the runway incursion of the ARG airplane.

### 1.10.3. Lighting at the airport and stop bars

The tower at the Barcelona Airport has a lighting Command and Display System (SMP) featuring consoles that display information on the status of the lighting system and that

can be used to configure it<sup>10</sup>. There are four SMP consoles in the East tower and two in the South tower. All of them have the same features and the same permissions.

The SMP can be programmed with a lighting configuration for the runways, for the taxiways or for both, including any exceptions. Each of the lighting components can also be operated individually.

Every lighting configuration is designed based on the taxi routes set up for each of the airport's active runway configurations. Every lighting configuration includes the status (on/off) for all of the airport's stop bars.

One of the positions for the light stand is next to the post for the local controller (LCL) and South Ground controller (GND S).

When the airport configuration is changed, the lights for that new configuration are turned on and the lights for the old configuration are kept on until the final aircraft reaches its corresponding apron.

The lighting system display is not integrated into the Automated Air Traffic Control System<sup>11</sup> (SACTA) and is displayed on another screen.

#### 1.10.4. *Other information about the airport and its surroundings*

The Master Plan for the Barcelona Airport was approved via Order 22566 of the Ministry of Development of 22 October 1999, published in the Official State Journal on 24 November 1999.

Chapter 6, Territorial Setting and Planning for the Delta, explains that the airport is located in the county of Bajo Llobregat, which contains the lower part of that river valley, the delta and an extensive ocean coastline.

From a city planning point of view, the area containing the airport occupies spaces that are within the limits of the towns of Prat de Llobregat, Sant Boi and Viladecans.

Within the areas affected by the airport, the Plan identifies two highly sensitive areas in terms of the environmental effect of the noise associated with the airport's activity: Prat de Llobregat, located north of the airport, and the coastal areas of the towns of Gavá and Castelldefels, both to the west-southwest of the airport.

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<sup>10</sup> A description and representation of the lighting system that is displayed for each configuration is contained in the document: OPERATING LIGHTING CONFIGURATIONS AT THE BARCELONA-EL PRAT AIRPORT DORE-09-INF-014-1.4.

<sup>11</sup> This system uses international standards for exchanging information, thus reducing manual operations to a minimum.

Chapter 14 of the plan, Environmental Management, and Chapter 16, Effects on the Land and the Environment, explain the actions contained in the Plan to minimize the noise impact in affected areas.

The fact that there are two daily runway configurations, one for the daytime and another for nighttime, is one of the main measures for combatting the noise effects.

### **1.11. Flight recorders**

By the time the CIAIAC was notified of the incident, it was no longer possible to obtain information from the recorders on either aircraft, though in this case the information that could have been extracted would not have added any information of use to the investigation.

### **1.12. Wreckage and impact information**

Not applicable to this case.

### **1.13. Medical and pathological information**

Not applicable to this case.

### **1.14. Fire**

Not applicable to this case.

### **1.15. Survival aspects**

Not applicable to this case.

### **1.16. Tests and research**

#### **1.16.1. *Information provided by the captain of the Airbus 340-300***

The captain of the ARG1163 reported that they were parked at stand 270. They were initially assigned runway 07L, with taxi route via taxiways NS, K and D. The taxi phase was carried out by the first officer.

When they were between positions D1 and D2 on the taxiway, they were redirected to take off from runway 25R, at which point he took control from the first officer to allow him to enter the new configuration into the Flight Management System.

They were then cleared to taxi on taxiway M and cross runway 02. When they reached holding point M5 for runway 02, they saw that the stop bar lights were on (red). They reported this to the controller they had been in contact with during the taxi phase, who turned off the lights on the stop bar and cleared them to continue.

Upon entering runway 02, the controller turned on the strobe lights and the captain asked the crew if they were "clear", since due to the 110° angle between taxiway M and runway 02, he was unable to see clearly to their right.

At that moment the first officer and the pilot who was seated behind him (both on the right side of the cockpit) warned him of an approaching airplane on short final, which caused him to accelerate his crossing of the runway.

The two pilots then told him that the airplane had gone around.

The rest of the taxi phase to holding point M1 for runway 25R, was uneventful, with no remarks from ground control.

When they were in that position they had to wait several minutes due to traffic arriving on runway 07L, after which they took off normally.

#### **1.16.2. *Information from the captain of the Boeing 767-300***

The captain of UTA5187 reported that they had taken off from the Domodedovo Airport (Moscow) and upon arriving in Barcelona, when they were on short final, they had to do a go around because an Airbus A-340 was taxiing across the runway.

They were making an ILS approach to runway 02 and after turning onto final, they were cleared to land. The autopilot had been engaged until they descended below 1,000 ft. At that altitude they stabilized the approach and decided to conduct the landing with the autopilot off and the autothrottle on.

While on the glide path, he heard the controller on the radio clearing an aircraft to cross the runway, but he stated in his report not recalling the aircraft's callsign. When they were at an altitude of about 1,000 ft, he noticed an Airbus A-340 approach the holding point for runway 02, left of the runway.

When he realized the A-340 was not going to hold short of the runway and that it was continuing to taxi, he decided to go around. Their altitude at the time was between 200 and 300 ft.

On their second approach to runway 02, 15 minutes later, they were vectored to the ILS 15 approach.

### 1.16.3. *Information from the controllers<sup>12</sup> and ENAIRE officials*

The controllers who were on duty on the day of the event were interviewed, at their request, in the presence of the ENAIRE Operational Safety Manager for the East Region, the Head of Operations and an Operations Coordinator specialist, who had clarified certain general questions pertaining to operations before the interviews.

The first thing they stated is that normally large airplanes (with heavy wake turbulence) do not stay overnight at the Barcelona Airport, and it just so happened that it was the first time that an airplane of these characteristics requested to take off from runway 25R first thing in the morning.

They also noted a Letter of Agreement<sup>13</sup> that states that following the last landing, there are no more departures in the nighttime configuration because traffic is directed to the daytime configuration. They confirmed that the nighttime to daytime configuration change takes place at 07:00.

When the configuration in use is not the preferred one, the stop bar lights at M5 are turned on as a backup measure to avoid crossings of runway 02.

Consideration is being given to allowing only the Local controller to turn off the stop bars.

They also noted that there is a Noise Technical Working Group (GTTR in Spanish) at the airport with representatives from the regional and the local city governments.

They stated there are only eight chief supervisors among the controllers, a figure they deemed insufficient, as evidenced by the fact that on some shifts there are no chief supervisors on duty. They specified that the supervisor is always in the East tower, which is the main tower.

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<sup>12</sup> The controller who was working Clearances was not interviewed as she played no significant role in how the events unfolded.

<sup>13</sup> The Letters of Agreement are documents that specify courses of action between different ATC stations.

On the day of the incident there was a chief supervisor. In the Barcelona Airport tower, the chief supervisor makes very important decisions, but there is no specific training that supervisors must undergo.

Another issue they highlighted is that the automated Air Traffic Control System (SACTA) is not integrated into the lighting display system, which requires them to look at two separate displays. They thought it important to have the two systems integrated.

As for the minimum rest periods for controllers, they reported that it was the same for all controllers, regardless of the work load they have.

Something else they noted is that during runway configuration changes, they are under great social pressure, as on many occasions they have received harassing phone calls in the tower containing personal threats against them.

The Head of Operations noted a series of relevant technical issues, as detailed below:

- The Barcelona Airport has significant limits imposed by large wingspan aircraft, which places considerable stress on ground controllers.
- This airport had never had so many large aircraft, especially not all concentrated in such specific time periods.
- Most airplanes request the preferred runway, but increasingly, crews are requesting a non-preferred runway, which causes considerable problems when taxiing.
- He thought it very important to have a supervisor in each tower.
- When a configuration is loaded at the Supervisor's post, this also loads the necessary communications and the cameras as well. This is very important since, in his opinion, controllers should not be allowed to sectorize<sup>14</sup> their own posts; rather, this should be done by the supervisor.
- The stop bars are always on unless they are for an inactive runway and are part of a procedure.
- There are procedures for crossing active and non-active runways, but deciding on the best way to let everyone know whether a runway is active or not is still to be determined.
- The alternate (non-preferred) nighttime configuration, as determined by the wind, is to have landings and takeoffs on 25L and never to use runway 20.
- The stop bar policy is to have them all turned on, except when an aircraft crosses an inactive runway or if it is part of a taxi procedure. For an active runway, only the local controller can authorize its crossing.

To conclude, the Chief Supervisor also suggested to have the active runway shown on the lighting display. The East Region Manager suggested that only the controller on the local frequency, and not the ground controller, should be able to turn off the stop bars.

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<sup>14</sup> Sectorize refers to turning on the equipment at a control post and loading a configuration into that post.

### South ground controller, who was in the main (East) tower

At the time of the incident she was working in the main (East) tower at post no. 3. She was in charge of South Ground on the 122.225 MHz frequency.

She had gone on duty at 22:00 the night before and went on watch at South Ground at 05:30, following her required rest period. She completed her shift at 07:30.

At 05:30 she was responsible for all ground movements (known as a combined post) and for clearances. As other colleagues went on watch, the responsibilities were distributed until, by 06:00, she was only responsible for South Ground.

She also noted that it is at that time when the clearances post is staffed in the main tower, while in the South tower, a single controller handles the responsibilities of North Ground and Central Ground.

Then, at 06:20, the ground and local frequencies are separated in the main tower, while the Central and North ground frequencies are separated at 06:40 in the South tower.

She also confirmed that the configuration in use at the time of the incident was the nighttime preferred, known as ENR, in which takeoffs are from runway 07R and landings are on runway 02. She stated that every day the controllers rotate throughout the various stations in the tower to which they are assigned that day.

As to how the event unfolded, she stated that she was handed ARG1163 by clearance delivery, and that its crew wanted to take off from the non-preferred runway, i.e. runway 07L instead of runway 07R (she underscored the fact that they were in a nighttime configuration). The crew reported it was ready to copy and requested pushback. She cleared them to push back facing west.

While ARG1163 was pushing back, she called north and central ground because the screen was showing blank strips, and north ground asked if it would be better to direct ARG1163 to runway 25R, since they thought it would reach the threshold at the same time as the configuration change.

She replied she would ask the supervisor, who in turn told her no, to have it taxi to the runway 07L threshold. As a result, she instructed ARG1163 to taxi via NS and hold short on taxiway K.

Later the supervisor told her it would be better to have the airplane taxi to the runway 25R threshold. She then talked with north and central ground, who asked her if the airplane was on taxiway D en route to the 25R threshold, to which she replied yes.

She then turned off the stop bar at the K7 position and coordinated with the controller who had just gone on watch at Central Ground, cutting it off from the north taxi route and telling him that she would be handing off ARG1163 when it was in a position to enter taxiway M.

She then coordinated the crossing on taxiway D with the controller on the Local approach frequency (both takeoffs and arrivals). This controller was seated next to her (to her left), meaning the exchange was in person.

The Chief Supervisor intervened at this point to explain that there are no set taxi times at the Barcelona Airport; rather, they assume a 15-minute taxi phase in general. For this aircraft they had a 20-minute taxi window, and it was within that window. In fact, ARG1163 took off on time.

He also noted that the overall taxi time is the Estimated Off-Block Time (EOBT) plus the Taxi Time, which yields the Estimated Takeoff Time (ETOT), plus or minus a 15-minute window.

There is no system in place to ensure collaboration between the parties involved in turning aircraft around at the airport (Airport Collaborative Decision Making, A-CDM), but such a system is expected to be implemented soon as it is already in the analysis phase. He also said that controller rest time is specified in an ENAIRE document (EI 1001).

Continuing with her account, the controller stated that she told ARG1163 that it would have to take off from runway 25R. She then spoke with the supervisor, telling her she would direct it along taxiway D and then on M to the runway 25R threshold.

As she was coordinating with her colleague on arrivals and departures, ARG1163 was crossing runway 02 for the first time (taxiing on taxiway D). She allowed the crossing by turning off the stop bar lights and asking the crew not to stop.

She then signed off from the crew and transferred them to 121.65 MHz.

She stated that the departure of the Aerolineas Argentinas flight is a routine procedure, but not at that time of the morning, as the airplane never overnights at the airport and at that time of day there are usually no crews requesting the non-preferred configuration.

Finally, she said that non-preferred traffic departs using the configuration that is in use by procedure, and that it was unusual to direct an aircraft to the 25R threshold when the runway in use (operational) was 07L.

She also noted the fact that it occurred just as the configuration was being changed.

She suggested that in a similar situation, it would be best to delay the start-up clearance and not force an aircraft in an unusual situation (leaving at a time different from its usual departure slot) to taxi during the airport's daily configuration change.

She proposed that to avoid an incident, the airplane should have been made to wait 10 minutes, as this would have sufficed to avoid the runway incursion.

### **North ground controller, who was in the South tower**

She was in the South tower in the North and Central Ground controller's post. She had started her shift at 06:00, at which time traffic was taxiing mainly from the north, heading toward the east tower and crossing runway 25R<sup>15</sup>.

She transferred departures when the airplanes were at J7, and she routed arrivals via taxiway DA through to taxiway E.

At about 06:40 they called her to tell her ARG1163 had requested the non-preferred runway (07L). She looked at the strip and saw that the EOBT was 07:00, and that it could not go to that position at that time as it was going against the traffic flow (it takes this airplane too long to push back). She told this to the South Ground controller in the main tower, who in turn checked with the supervisor, who said that yes, there was enough time. She also mentioned there were no arrivals at that time.

Her colleague then told her that ARG1163 would proceed to 25R instead, and that it would be routed via taxiway D instead of E, as per procedure when runway 25R is active. She stated that this causes a lot of confusion, but that she was relieved in a way because she would not have interference from the traffic she was coordinating and that was taxiing on taxiway E.

She also noted that when the South Ground controller asked the supervisor to confirm the takeoff runway, and the supervisor said 07L because there were no arrivals, the supervisor meant that there were no arrivals on runway 25R that would impede a takeoff from runway 07L. The controller, however, interpreted this to mean that there were no more arrivals on runway 02 (which was active, as they were still in the nighttime preferred configuration).

They had never been in this situation. She thinks that the initial hurry to speed up the taxi phase of ARG1163, followed by the change in takeoff runway, which relieved the time pressure, caused some confusion.

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<sup>15</sup> The Chief Supervisor showed, using two graphs of traffic flow in these areas, how aircraft never cross runway 02.

She also mentioned that there are many limitations at the Barcelona Airport due to the wingspan of airplanes, and that lately there has been an increase in the number of crews requesting to take off from the non-preferred runway. These aircraft cause problems taxiing and coordinating traffic because when they are on final, they have to be separated by 8 NM instead of 3 NM, as happens with all remaining aircraft.

She continued her account by noting that the supervisor decided that ARG1163 had to take off from runway 25R and that it had to be routed via taxiway D, as required by procedure to taxi to 25R. The problem with this, however, is that it would have to cross the active runway twice.

At 06:40, another colleague relieved her and she transferred to him the Central Ground frequency and taxiing traffic on D. When he went on watch, her coworker asked about the configuration, and she called the main tower to ask if she had to load the ENR nighttime configuration into the screens. The reply was yes, and the supervisor told her to turn on the non-preferred lights. She further informed her that there was still one inbound flight, a EUROTRANS airplane that was near. She confirmed not acknowledging this information, as a result of which the report that there was still one airplane in the air was unclear, meaning her relief was unaware of this. In other words, there was still traffic inbound to runway 02, although she did not expressly tell him that there was no inbound traffic.

Her coworker loaded the configuration into the screen at his post (sectorization) and she informed the supervisor that he was loading the sectorization. There were no further communications.

When she handed Central Ground over to her relief, she informed him that there was an airplane, callsign ARG1163, taxiing on D heading to runway 25R.

Her colleague did not have in his area any traffic pushing back and definitely no taxiing traffic, meaning ARG1163 was the first aircraft with which he communicated.

She noted that traffic landing on runway 02 was to their backs since they did not control those arrivals, and therefore from their posts they could not see the 02 threshold, but only the area under their control.

In her opinion, her relief was unaware that they were in the process of changing configurations and he applied the daytime configuration (WRL) procedures.

She stated that the lights are on by default. This implies that all the stop bar lights were on, except those for the inactive runway.

Though she heard her coworker ask why this stop bar was not off, since ARG1163 had called him about it, she had not really heard the comment as it did not apply to her area.

She explained that during the daytime configuration that stop bar has to be turned off and on, unless it had to be off because the runway was active (which was not the case). Moreover, this serves to keep crews taxiing on D from getting confused and entering taxiway M.

She also noted that they are usually very careful with crossings of runway 02 at the E2 and K7 intersections, in case there is still traffic inbound to 02 in the air. But once the airplanes have crossed those intersections, very rarely will they have to cross again.

Her coworker turned off the M5 stop bar to let ARG1163 cross, because during the day runway 02 is inactive, and whenever there is a non-preferred takeoff, it is the controller who turns it off.

This means that in the minds of controllers in the South tower, during the day the stop bars in place to cross runway 02 are not really there to impede crossings, but to direct traffic on taxiway E to the east.

In her opinion, this could be improved if the supervisor used the expression “final arrival” during the configuration change process. She thinks that standardizing the phrases would be a good measure, since even though they are normally used, in this case they were not.

Another action that could have prevented the incident would have been delaying ARG1163 a little more; that is, extending its EOBT by a little, which would not have kept it from taking off at its schedule time from runway 25R.

Another suggestion she made was for supervisors to pay more attention to the south tower, which is isolated.

#### **Local controller (takeoffs and landings), who was in the main (East) tower**

He was on the local frequency, responsible for arrivals and departures. He was in the East tower due to the cross-runway configuration and had been at that post since 06:20. The controller who had been at the single watch station since 05:30 turned over clearance delivery to another controller who went on duty at 06:00, and she turned over the local frequency to him when he reported for duty. He stated that aircraft leaving runway 02 usually do it via rapid exit taxiway UB and once they report the runway clear, the local controller confirms it on the multilateration (raster) display, since from his position he cannot see it and his attention is focused on the 02 and 07R thresholds, and especially on the intersection of these two runways, which are the active runways at night.

He underscored the problematic nature of the intersection of runway 02 and taxiway M because from his post (PICT 2 – Integrated Post Control Tower 2), he can only see it on

the screen. This intersection, however, as well as rapid exit taxiway UB, can be seen from PICT 2 if the controller stands up, moves over a few steps and looks in that direction. But doing so requires turning away from the 02 and 07R thresholds and from the intersection of these two runways, which are key points when operating in this configuration.

ARG1163 crossed runway 02 first at the intersection between points K7 and K6, and then at the one between points D1 and D2. Both of those crossings were coordinated with South Ground because UTA5187 was still far away. They saw there was time for ARG1163 to taxi on K and D under the control of South Ground before being transferred to Central Ground.

He explained that taxiway K is under the control of South Ground, and taxiway D of Central Ground, but usually, when the workload is light, aircraft going to the runway 25R threshold from the south side of Terminal 1 taxi on D from K until they are short on taxiway M, connected by way of the South Ground frequency after coordinating with Central Ground.

Traffic is transferred to Central Ground while it is taxiing northbound on D, with the instruction to stop before reaching taxiway M.

When ARG1163 crossed the first time, UTA5187 was still far away and had not intercepted the localizer, so the controllers thought it could cross the runway. They decided this because the ground controller and he were in adjacent posts (PICT 2 and PICT 3), and they coordinated speaking off-frequency (the term "frequency" meaning when they are talking to aircraft crews), though communications between controllers are usually handled on the hotline.

Before clearing UTA5187 to land, he stood up to check that all the stop bars protecting runway 02 were on. He did so by looking at the panel for the lighting command and display system to the left of PICT 2. After verifying they were on, he cleared it to land with an aircraft lined up at the 07R threshold awaiting takeoff clearance once the 07R-02 intersection was clear after the landing of UTA5187. There was a second and last arrival on runway 02 that was 4 NM out behind UTA5187.

He reported that the minimum separation he uses is 4 NM to allow takeoffs on 07R. When UTA5187 was over the threshold, he saw it go around and as he followed it visually, he stood up and looked to his right. It was then that he saw ARG1163 crossing runway 02 where it intersects with runway M. He was shocked and he even became upset and let out a scream when he realized what had happened. He then instructed UTA5187 to follow the standard go-around procedure and transferred it to approach control.

He did not let the airplane at the 07R threshold take off and coordinated with his colleague in the Control Center because when there is a go around, takeoffs are usually stopped (though not always). The coordination was handled through the supervisor.

ARG1163 cleared runway 02 and he himself cleared the traffic behind UTA5187, which was last in the landing sequence for runway 02.

UTA5187 later landed on 02 after ARG1163 was cleared to take off on runway 25R.

The post he was in is the only place where he can remain in the same position when the airport's configuration is changed (both at night and during the day).

According to him, when the configuration is being changed, the supervisor should review with the personnel on watch in the South tower the status of the arrivals and departures, that is, what the last traffic to arrive and depart on each runway will be before the configuration change goes into effect.

Another issue he noted is that sometimes the hotline and the frequency are both active at once, so they have to make sure before speaking that both are not transmitting at the same time. Even so, a crew will sometimes call on the radio frequency while they are coordinating on the hotline, inevitably leading to overlapping communications.

He also stated that no activity should be allowed on 02/20, as it leads to many runway incursions, and that it would help to have a supervisor in each tower.

In his opinion there is a staffing shortage at the towers in the Barcelona Airport, especially considering that there have been no personnel transfers in the last 3 or 4 years.

### **Central ground controller, who was in the South tower**

He went on watch in the tower at 06:40. A colleague was responsible for the North and Central ground frequencies, and he asked her which configuration to load into the screen to take over Central Ground. She said to load the ENR nighttime configuration.

He loaded the screen at console 16-18<sup>16</sup>, which used to be the supervisor's post in the South tower. He then asked his colleague what flights were active, and she said there was nothing except for an Aerolíneas Argentinas airplane on the taxiway heading to runway 25R.

Two minutes later he was called on the hotline by the South Ground controller to transfer to him ARG1163, which was taxiing on D to short of M (she called again to repeat the message since his reply was not heard the first time on the hotline, he suspects because he was not holding down the talk button).

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<sup>16</sup> If he had loaded the daytime configuration, it would have been loaded automatically into all of his coworkers' screens.

ARG1163 called him when it was short of M and he cleared it to turn right onto taxiway M and to cross runway 02/20.

The crew of ARG1163 asked if they could cross runway 02, and that is when he saw the stop bar at M5 was turned on. He asked his colleague if the stop bar had been turned off and then proceeded to turn it off himself.

He then saw an aircraft go around and it took him a couple of minutes to realize the airplane had aborted a landing on 02. He then spoke to South Ground, telling the controller he was unaware of any inbound traffic on 02.

Although he loaded the correct configuration (nighttime), he assumed there was no more traffic landing in that configuration.

In his opinion, to avoid a repeat occurrence of this event, only the controller on the Local frequency should be allowed to turn off the stop bar lights, and the stop bar on taxiway M should only be turned off when runway 02 is not active.

He also thought the configurations should be loaded by a supervisor, and not by the controller. A checklist or a turnover meeting would also help with the watch relief process.

Lastly he stated that the mere fact of working in the South tower means there are communications problems sometimes.

### **Supervisor, who was in the main (East) tower**

She went on duty at 06:24, and her job was to oversee the configuration change.

In referring to the event, she stated that she was called by South Ground and asked where ARG1163 had to take off from. In light of its scheduled departure time, she thought it would be best if it departed from the non-preferred runway, which was 07L, though she doubted if there was sufficient time. She decided to coordinate with the Control Center, and verified that it would not have time to take off from that runway at that time.

It took a while for the Control Center to reply, and in the meantime she was not overseeing the taxiing of ARG1163. By the second time she was asked, she had already confirmed with the Control Center what the last inbound airplane on 02 would be, and then she realized that it would be better for ARG1163 to taxi to the 25R threshold.

She then continued entering data into the ATIS (Automatic Terminal Information Service) and doing other routine supervisory tasks.

Before UTA5187 missed its approach, she spoke with the Central Ground controller, who had asked her which lighting configuration to use and if he should turn on the lights for the takeoff of ARG1163. She informed the controller that the configuration was ENR and non-preferred lights for runway 25R. She also told him that the last inbound traffic on 02 was a EUROTRANS airplane.

The message was not acknowledged, but she was not aware that the controller had not understood her message.

She then heard and saw that UTA5187 had gone around.

She thinks that better coordination is needed, but she does not think having a supervisor in the South tower would improve the situation, though it would help to have someone off-frequency (like an assistant) to talk to.

What she wanted to underscore is the fact that the information she wanted to convey was not received, and that is what might have failed.

She also thought that Chief Supervisors need more information, and that this issue is of great importance.

Another aspect she thought important was having greater ability to coordinate and having any instructions stemming from that coordination accepted, not questioned.

In short, she thought that the lack of coordination was due to problems involving physical barriers, conviction of pre-conceived notions, questioning the supervisor's decisions and the schedule change of ARG1163.

## **1.17. Organizational and management information**

### **1.17.1. *Information provided by Aerolíneas Argentinas***

In July, the airline's flights at the Barcelona Airport arrived at 13:35, Monday to Saturday, and departed at 19:20. The flight code for the inbound flight is ARG1160 and for the return flight it is ARG1161.

The airplane involved in the incident should have left on 4 July at 19:20, but flight ARG1160 (SAEZ-LEBL), scheduled to depart Buenos Aires at 01:55 UTC on 4 July, was rescheduled, due to the unavailability of the crew, to depart at 13:10 UTC on that same day with callsign ARG1162, and not ARG1160.

The flight number is changed in these cases to avoid having two flights with the same callsign on the same date. The flight ended up departing at 14:10 UTC, landing at the

Barcelona Airport at 02:20 UTC (in-block time) on 5 July. That is why it was scheduled to depart Barcelona at ARG1163 at 03:55 UTC, though the actual start-up time was 04:20 UTC and it took off at 04:47 UTC.

### 1.17.2. *ENAI* procedures

#### Training of tower controllers

The Training Plan for the Barcelona Tower<sup>17</sup> specifies the program that a controller who will be joining this station must follow in order to obtain the unit endorsement<sup>18</sup> and thus be able to stand watch as an executive controller at the various posts in the Barcelona tower.

The program has a theory phase (transitional part) and a practical phase (on-the-job instruction).

- 1) The transitional part itself has two separate parts:
  - a) General theory, which refreshes the student's knowledge and provides a basis for the aerodrome control instrument (ADI) rating.
  - b) Specific theory. The goal of this phase is to give trainees information on the issues specific to the unit, i.e. on the operational and technical environment in which they will perform their duties.
- 2) On-the-job training. In this phase the trainee provides control services in a real operational environment under an instructor's supervision. This phase lasts a minimum of 90 hours or one month (whichever is greater). If the trainee comes from a station whose unit endorsement features the same ratings, the number of hours can be reduced by 25%.

While not specifically considered in the training plan, the practical training includes three days of simulator sessions where the focus is on practicing the non-preferred, and thus less usual, configurations at the airport. These sessions, involving simulated traffic, take place at the ACC radar control post, where what is shown on the display is a representation of system at the TWR control post. Thus, the physical reality of the control room is not reproduced (in terms of the locations of the control posts, outside visibility, blind spots, etc.). This session does not allow interacting with the stop bar

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<sup>17</sup> LEBL training Plan A331A-10-PES-030-2.0

<sup>18</sup> Endorsement added to a license, of which it is a part, which notes the ICAO location indicator and the sectors and/or job posts where the license holder is qualified to work. In the case of the Barcelona tower, these entries do not indicate a specific post (LCL, Area GMC) or the operational configurations to which they apply.

system or simulate the coordination between the two towers, between the control posts or between a control post and a supervisor using a hotline.

The training plan does not specify that the controller must receive on-the-job training for each of the airport's operational configurations, not even for the preferred configurations. The configuration changes are taught on a theoretical level but the document does not explicitly require any hands-on training in this area.

There is also a Qualification Plan<sup>19</sup> whose goal is to have controllers maintain the operational skills associated with their unit ratings and endorsements.

It specifies that controllers must stand watch at least 80 hours a year in the executive controller's post in order to maintain their unit endorsement. They must also stand watch at every post at least once each six months.

This plan also does not require a minimum number of hours per operational configuration, not even the preferred ones, or a minimum number of hours during configuration changes.

The Qualification Plan includes the theory and practical training they must receive annually. It features a course on emergencies and special situations that includes a module on non-preferred configurations. As a general rule, the duration of the training on emergencies and special situations is six hours per calendar year.

### Procedure for crossing runways

The Local controller is in charge of the active runways. When the airport is in a parallel runway configuration, there are two local controllers, one in charge of the preferred runway for arrivals and another in charge of the preferred runway for departures. During cross-runway or single-runway operations, there is a single controller responsible for departures and arrivals.

A runway must be crossed as per the relevant procedure<sup>20</sup>, which in general specifies the following:

- The local controller is responsible for expressly authorizing the crossing of an active runway under his control.
- Ground controllers will authorize all movements by aircraft, vehicles and people that involve crossing an inactive runway under their control.

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<sup>19</sup> LEBL Qualification Plan A331C-10-PES-029-2.0.

<sup>20</sup> PROCEDURE FOR CROSSING RUNWAYS AT THE BARCELONA-EL PRAT AIRPORT. S41-10-DTC-003-1.1.

- The standard lighting configurations are programmed such that all the stop bars that protect the active runways in that configuration are on, as well as those stop bars that protect inactive runways that are not crossed as part of a standard taxi route.
- A clearance to cross is issued not only verbally on the frequency, but the stop bar on the SMP must be turned off. Once the runway is crossed the stop bar must be turned on again.

The steps to follow for crossing a runway are different depending on whether or not it is active.

For an *active runway*:

- The ground controllers will coordinate the runway crossing with the local controller responsible for that runway, to notify him of the request to cross and of any relevant information.
- Once coordinated, the ground controller will send the traffic to the relevant holding point, ensure that the stop bar (if present) is on, and transfer communications to the local controller after reminding the traffic to hold short of the runway.
- Before authorizing the crossing of the runway, the local controller will notify the ground controller of the taxiway to which the traffic will proceed after crossing, so as to coordinate the limit clearance.
- The local controller will decide on the suitable moment for the crossing, turn off the stop bar and issue the clearance to cross.
- Once the traffic confirms having crossed, the local controller will transfer it to the corresponding ground frequency.

An *inactive runway* will be crossed as follows:

- The relevant ground controller is responsible for authorizing the maneuver.
- Even if the runway is inactive, any instruction involving crossing a runway must expressly include the clearance to cross it.
- When crossing a runway is not part of the standard taxi route for the configuration in use, the stop bar will be on. In this case, the ground controller must turn it off when the runway crossing clearance is issued, and once the runway is crossed, the stop bar will be turned on again.

### Findings in the report on the incident written by ENAIRE

ENAIRE carried out its own analysis of the event. The table below shows the times at which a specific event took place that resulted in the runway incursion by ARG1163, and in the ensuing go around by UTA5187:

Hora	Análisis
06:40:18	<p>The South Ground and Central Ground controllers coordinated with the supervisor to confirm whether ARG1163 would taxi to the threshold of the new configuration or not. The supervisor decided to have ARG1163 taxi to runway 25R, since the configuration will be changed soon and the WRL will be activated.</p> <p>During this exchange, the supervisor told the Central Ground supervisor there was no inbound traffic.</p> <p>GND S: "H...?"  GND CN: It's almost ready, it will go to 25 left. No? To 25 right.  GND S: Ehh  GND S: Ah... I'm asking now.  GND CN: OK because...  GND S: Remember to take over the traffic.  GND CN: Take them over.  GND CN: So, Listen, the Argentina..., since we change over at 7, I don't know... ask around there.  GND S: Well, it should be 07 left.  GND CN: OK, very good.  (SUPER): "[Name of the North Ground controller], are you there?  GND CN: Yes, go ahead.  (SUPER): No. The Argentina plane, it's going to be fast, because they have to put more things in, so it'll be late...  GND CN: I'm saying it because it always takes longer, that's what I was saying, but it doesn't matter to me.  (SUPER): We'll send him across 25 and send him... <b>Besides, there are no more arrivals.</b>  GND CN: OK, OK...</p>
06:43:59	<p>New exchange between the same three individuals to confirm that ARG1163 has started to taxi and that it will end up going to runway 25R. As soon as this exchange is over, the Central Ground controller asks the supervisor if the current configuration is ENR, to which she replies yes, and asks her to turn on the non-preferred lights and mentions one final arrival, the EUROTRANS, all in a single message and using somewhat ambiguous phraseology.</p> <p>The CN GND controller replies with an "OK" and tells her that another controller "is loading".</p> <p>GND S: The Argentina plane is taxiing.  GND CN: Very good.  GND S: Yes, on Delta and it's 25 right after all.  GND CN: Ah... I told you so.  GND CN: Hey, what's loaded in now, ENR?  (SUPER): <b>Yes... set it as a non-preferred takeoff. They gave me the last flight, the EUROTRANS, and it's right there and that's why we're...</b>  GND CN: <b>OK, what's this S... loading.</b></p>

Hora	Análisis
06:49:34	<p>There is another exchange between the South Ground controller and Central Ground controller to transfer control of ARG1163. The Central Ground controller is located in the South tower and just manned the post. During the relief he was told "you don't have anything", meaning he is unaware that there are still two airplanes inbound on 02. The South Ground controller informs the Central Ground controller that it is transferring ARG short of taxiway M.</p> <p>GND-S: Hello            GND-C: Go ahead            GND-S: I'm passing you the Argentina short of Mike            GND-S: S... ¿are you ok?            GND-C: Go ahead, go ahead.            GND-S: Ah... right, I'm passing you the Argentina short of Mike.            GND-C: Ah, you didn't hear me? OK, OK...            GND-S: No... Right, you were left speechless.</p>
06:50:36	<p>The GND-S controller transfers ARG to GND-C. At that point the traffic is clearing the runway 02 crossing and the UTA is 5.5 NM out.</p>
06:50:50	<p>ARG1163 contacts the Central Ground controller, which clears it to continue on taxiway M, cross runway 02 and hold short of runway 25R, but there is no coordination between the Local controller and the Central Ground controller.</p> <p>ARG: Barcelona ground good morning ARG1163 next on taxiway Mike.            GND-C: ARG1163 good morning, turn right on Mike, cross 02 and hold short 25 right.            ARG: Right on Mike, cross 02 and hold short runway 25 right, ARG1163.</p>
06:50:55	<p>The Local controller confirms that the stop bar lights are on and clears UTA5187 to land when it is 4.8 NM out from the runway 02 threshold.</p> <p>LCL: UTA5187 cleared to land 02, wind 330/07.            UTA: Cleared to land 02 UTA5187.</p>
06:52:02	<p>ARG1163 is on taxiway M and comes up on an energized stop bar. The crew requests confirmation to continue taxiing and cross runway 02. The Central Ground controller, believing the light is on to avoid a possible runway incursion on runway 25R by an improperly taxiing aircraft, and not because runway 02 is active, turns the stop bar off and confirms the taxi instructions to ARG. The controller is unaware that the UTA is 1.9 NM out.</p> <p>ARG: Confirm ARG1163 can cross runway 02?            GND-C: You may continue.            ARG: 1163.</p>

### 1.18. Additional information

The Civil Aviation Accident and Incident Investigation Commission (CIAIAC) already investigated and published the final report on another incident involving similar circumstances (IN-021/2012).

In that case, a Boeing 737, with callsign RYR6363, was making an ILS approach to runway 02 at 07:00 on 27 May 2012. Its crew was in contact with ATC on the Local (LCL) frequency for runway 02. It was the last aircraft in the landing sequence for this runway before the configuration change from nighttime preferred to daytime preferred, which had been decided a few minutes earlier.

Also involved was an Airbus A-320, with callsign AFR2349, which was taxiing from stand 13 to the runway 25L holding point via taxiway K and crossing runway 02, as cleared by the South Ground controller, with which it was in radio contact. Shortly afterwards, RYR6363 was cleared to land on that runway.

Upon noticing the imminent runway incursion by AFR2349, the local controller alerted the ground controller, who instructed the aircraft to stop, which it did, but past the holding point on taxiway K7 that protects runway 02. In light of this, the ground controller instructed the aircraft to continue taxiing and the local controller asked RYR6363 to go around.

After completing the go-around maneuver, RYR6363 was cleared to make a new approach and it landed normally. AFR2349 continued taxiing and took off, also without further incident.

The investigation concluded that the incident occurred because the ground controller cleared AFR2349 to cross the runway without first coordinating with the local controller responsible for authorizing landings on and crossings of that runway, which was still active since the configuration change was not yet complete. The controller's lack of familiarity with that day's scenario, resulting from not having received hands-on training in that configuration, influenced his handling of the situation, which reflected a configuration that was more familiar to him and in which landings were not expected on runway 02, especially at a time with few arrivals at the airport.

The following recommendations were issued:

**REC 29/13:** It is recommended that AENA (now ENAIRE) modify the Training Plan for the Barcelona tower so as to guarantee that a minimum amount of time is spent during the practical training periods in each and all of the preferred airport configurations as well as in changing configurations before a controller receives the unit endorsement.

**REC 30/13:** It is recommended that AENA (now ENAIRE) modify the Barcelona tower Qualification Plan so as to guarantee that a minimum amount of on-duty time is spent in each of the preferred airport configurations as well as in changing configurations as a requirement for tower controllers to maintain their operational proficiency.

The final report was approved by the CIAIAC at a plenary meeting on 26 June 2013. On 4 July 2013 ENAIRE was sent a letter notifying it of the final report and the safety recommendations being issued. On 8 July 2013 ENAIRE acknowledged receipt of the report.

On 18 September 2013 ENAIRE replied to the actions taken in response to the recommendations, saying, with respect to REC 29/13, that "the Regional Evaluation and Training Department is in the process of modifying the current Training Plan to stipulate a minimum number of hours to be given to each Air Traffic Controller at each of the preferred configurations before being granted the endorsement".

The current status of this recommendation is OPEN, RESPONSE SATISFACTORY. IN PROGRESS, since the CIAIAC's understanding is that the recommendation has to remain open until the change to the Training Plan is implemented.

As concerns REC. 30/13, ENAIRE reported that "to comply with the 'National Aviation Safety Agency Directive on the provision of air traffic control services and maintaining proficiency', issued by AESA on 28/09/2012, a document was written called 'Procedure for maintaining proficiency in the tower', A331C-12-PES-005. Also generated were 'Guidelines for applying the procedure to maintain proficiency in the tower', reference code A331C-13-GUI-001, for those towers where operational configurations are not implemented in the SACTA system, that is, for every tower in the ENAIRE network except LEMD, LEBL and LEMG".

The current status of this recommendation is also OPEN. RESPONSE SATISFACTORY. IN PROGRESS, since the reviewed "Procedure for maintaining proficiency in the tower" states that ENAIRE "must ensure that all its personnel are regularly and uniformly rotated through all the posts included in the relevant unit endorsement". In addition, "in the event where more than one operational scenario exists, the rotations will be computed for each one independently". This recommendation will be kept open until the requirements of these stipulations are transferred to the Qualification Plan for the Barcelona tower, as the recommendation asks.

On 5 June 2015, the CIAIAC sent a new memo to ENAIRE asking about the status of implementing the two recommendations. No reply has been received to date.

### **1.19. Useful or effective investigation techniques**

The investigation analyzed the influence of human factors by using two different models:

One was the generic error-modeling system (GEMS), which classifies error types arising from human intervention and which has proven useful in associating the behaviors of the people involved in the event with a series of patterns that have been thoroughly

established through previous analyses and studies. This model differentiates between two fault types: mistakes and violations.

Mistakes occur involuntarily and may be due to execution faults (skill-based), to an incorrect interpretation of a norm (rule-based) or to incomplete/inaccurate understanding (knowledge-based). Rule-based and knowledge-based mistakes are often confused since the absence of skill and a lack of knowledge tend to have a common origin, which is a lack of procedures.

Violations, on the other hand, occur when a decision is made to deliberately break a rule. They can be routine (partial non-compliance with a rule that we know well because we do it as a matter of habit), situational (isolated and occasional non-compliances that save work), to show off or they can be exceptional (a completely anomalous situation in a way requires violating the rule).

The event was also analyzed by considering those involved not as isolated parts, but as interacting with one another in a specific work setting. This relies on using the model that studies the various interactions that can take place between people (liveware), their physical work setting (hardware), the organization (software) and the environment (environment), what is known as the SHELL (Software-Hardware-Environmental-Liveware-Liveware) Model. Interactions between a person and the other factors in this model are called (L-H, L-S, L-L and L-E).



## 2. ANALYSIS

### 2.1. General

The Barcelona Airport has a significant factor conditioning its operations, namely, the fact that it has to change its configuration every day at 07:00 and 23:00 due to problems stemming from the environmental effect resulting from the noise generated by its activity in certain neighborhoods surrounding the airport.

This situation requires the use of the cross runway (RWY 02) from 23:00 to 07:00. The most significant problems always occur around 07:00, which is when the nighttime to daytime configuration change takes place. Shortly before, many aircraft begin taxiing to take off, starting at 07:00, and while taxiing they are forced to cross runway 02, often more than once.

In other airports, it is common to have a standard configuration that on most days is dictated by the wind in the area, and to change it only occasionally.

If only the parallel runways were used, as is currently done in the daytime configuration, the high risk that is now present during the configuration changes, especially from nighttime to daytime, would be eliminated.

There is also the fact that changes in wind direction in and around the airport are frequent due to its location near the coast<sup>21</sup>. Other factors, along with the fact that there are three operational runways (six thresholds), mean that there can be up to twelve possible configurations, even if three of them (those involving the use of runway 20) are rarely used.

In addition, the airport has significant limitations in terms of taxiing for large wingspan airplanes. Operations at the airport involving airplanes of this type have increased in recent years. These operations generally take place at certain times and coincide with peaks in both arriving and departing traffic.

Some large airplanes (approximately 20%) request to take off from the longest runway, 07L/25R, which is the runway used for landings in the preferred configuration. This hampers taxiing maneuvers and, along with the other circumstances already mentioned, places certain limits on the airport's operability and poses certain safety risks.

The combination of all these situations places significant stress on controllers, whose mission is to attempt to keep traffic flowing while maintaining optimum levels of operational safety. On top of this is the social pressure they are subjected to when, due

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<sup>21</sup> In coastal areas, sea breezes blow offshore at night and onshore during the day.

to some circumstance stemming from the mechanics of traffic control, there is a delay in changing from the nighttime to the daytime configuration.

## **2.2. Study of the factors involved in the operation**

As far as the operation involved in this event is concerned, it should be noted first and foremost that flight ARG1163 was not scheduled to take off at that time of the day. That airplane usually does not stay overnight at the airport, as its normally scheduled departure time is early in the evening, when there is less traffic and when there is no chance of making mistakes associated with the configuration change.

This airplane has a large wingspan, which hampers its taxi operations. From its parking stand, it had to cross the active runway up to three times.

Secondly, considering the mechanics of the operation itself, another aspect to note is the information provided by the various controllers and their supervisors in the sense that every controller has the same set rest periods, regardless of which post they were assigned to and what their workload was. It seems very reasonable to think that these times should be adjusted to better reflect the amount of work they did. As a result, a safety recommendation is issued to ENAIRE, requesting that it conduct a detailed analysis of the workload at each post and that it make an effort to allocate rest times in a way that better reflects the work load at a controller's previous post.

A third aspect noted during the investigation is that the controller at the local frequency, that is, the one responsible for takeoffs and landings and who is best informed as to what aircraft are about to land and in what sequence, and who is aware of potential problems associated with each operation, was not the one who authorized ARG1163 to cross the runway. In fact, this controller could not even see the airplane from his position. It was only when he saw UTA5187 going around that he stood up and looked over to see what was happening.

The runway crossing procedure gives him the power to expressly authorize the crossing of an active runway under his responsibility. It also requires ground controllers to coordinate a runway crossing with the local controller, to inform him of the crossing request and to provide him with all the relevant information. This, however, is in stark contradiction with the fact that from his post, he is unable to see the intersection of taxiway M and taxiway 02.

As a result, it seems logical that this controller should have the final say as to what happens on the active runways. As such, he should be responsible for turning off the stop bars, which are always on, when a taxiing aircraft has to cross an active runway. This is already specified in the Operations Manual at LEBL, but in this case it was not enough to avoid the runway incursion. It is thus necessary to set up additional barriers

to avoid potential mistakes, as well as mechanisms to mitigate said mistakes and their effects once they take place.

A fourth issue that came up repeatedly in almost every interview with the controllers and the supervisors is the important responsibility given to the supervisor and how essential their coordination efforts are. Several interviewees noted that supervisors do not receive training specific to their job. This problem is also the subject of another safety recommendation made to ENAIRE to ensure that supervisors receive specific training.

As concerns the need for good coordination, it is important to underscore that the presence of two towers hampers this task, since many of the problems that may arise cannot be solved via face-to-face communications, as the individuals involved are not in the same location. This requires that controllers who are in a different tower than the supervisor contact him/her by telephone. Thus, it would be good to have one supervisor in each tower.

One final issue to bear in mind is that when a certain configuration is loaded into the supervisor's post, this also loads the necessary communications channels and cameras. This enables the person in the supervisor's post to have more information at hand, which aids in the decision-making process and helps the supervisor coordinate the efforts of the various controllers working on different frequencies.

To emphasize the importance of the supervisor's job, two additional recommendations are being issued to ENAIRE to, on the one hand, study the possibility of having a supervisor in each tower, and on the other, analyze the possibility of letting only the supervisor load each post's sectorization, instead of letting the controllers themselves load the sectorization for the post they will be occupying.

### **2.3. Human factors aspects involved in the operation**

Flight ARG1163 was scheduled to take off at 05:55, that is, with the airport in a nighttime configuration, though it did not start up until 06:20 and it took off at 06:47. That is why when the crew first contacted ground control at 06:20, ATC asked if they wanted to take off from runway 07L (preferred runway) or from 07R. In other words, it was assumed that it would take off before 07:00 and with the airport in a nighttime configuration.

At about 06:40, there was a conversation between the supervisor, who was in the main tower, the South Ground controller, who was in the same tower, and the controller who at that time was responsible for Central-North Ground. The latter asked the South Ground controller if it would be better to taxi ARG1163 to the 25R threshold, as it was going to reach the 07L threshold just as the runway configuration change was taking place.

The South Ground controller asked the supervisor, who at first insisted that it continue to the 07L threshold. It should be noted that, at first, there was no direct conversation between the person asking the question and the one responsible for making the decision; instead, the question was relayed through a third person. This led to a misunderstanding, since the supervisor thought her instructions were being called into question, when the intention of the Central-North Ground controller was probably to merely express a suggestion in an effort to speed up traffic.

This situation caused a certain amount of stress in the supervisor, as it distracted her from her coordination duties not only inside the tower, but also in the Control Center, which is a station outside the airport. She also erroneously thought that her instructions were being questioned. That is why she immediately called the North Ground controller and confirmed in person that the instruction was to have ARG1163 taxi to the 07L threshold.

At 06:43, however, there was a new conversation among the same three individuals in which the supervisor changed her mind, deciding it would be best to have ARG1163 taxi to the 25R threshold, though she did not explain her reasons clearly. In this conversation, the Central-Ground controller informed her that her colleague, who had just gone on watch at the South tower, and who would be handling Central Ground, was loading the nighttime configuration. The supervisor then gave her inexact or incomplete information, saying that the last airplane inbound on runway 02 was a EUROTRANS airplane, when in fact there was another airplane ahead of the EUROTRANS, namely UTA5187.

The controller replied by saying "ok" and did not provide an acknowledgement, as required. The conversation between the two involved vague and ambiguous phraseology, which made it impossible for the controller who was taking over at Central Ground to clearly understand that there were still airplanes inbound on runway 02, despite being seated next to his colleague.

It is difficult to determine whether the supervisor and North Ground controller engaged in what is known as a violation, as is classified in the GEMS model, because they knew they had to use standard phraseology and yet they did not because theirs was a routine conversation; or whether they made a rule-based error by exceeding their linguistic skills in an effort to resolve the situation quickly. In either case, the communication between the two was not sufficiently clear and it was non-specific.

When the South Ground controller transferred ARG1163 to the Central Ground controller as it went from taxiway D to taxiway M, there was a break in the conversation. For a moment the former was unable to hear the latter. It could have been because sometimes the hotline and the frequency are both active. As a general rule, it is much more preferable to ask the other party if they can talk before starting a transmission. Sometimes it is a crew that transmits on the radio frequency while controllers are coordinating on the hotline, which inevitably causes the communications to overlap.

The crew of ARG1163 acted correctly when they asked again, upon seeing the M5 stop bar on after having been cleared to cross runway 02, if they were in fact cleared to cross it.

At that point the controller was unaware they were still in a nighttime configuration. Thus, to him runway 02 was no longer active and he was sure there were no airplanes inbound on that runway (he did not even consider the possibility). In that context, he acted in keeping with the procedure for crossing an inactive runway, which gives him the power to authorize the crossing and turn off the stop bar.

Since runway 02 was active, the procedure required the Central Ground controller to coordinate with the Local controller, who is the one who should have authorized the crossing. This is not a failure to comply with procedure (violation), but there was a knowledge-based mistake because the controller was unaware of what configuration they were in, even though he himself had entered the nighttime configuration into the screen.

The chain of mistakes that were made reveals certain deficiencies in the interactions between the controllers that, in the SHELL model, are known as L-L mistakes.

But areas subject to improvement were also detected in the interactions between controllers and their physical surroundings (L-H), their organizational settings (L-S), and even their environment (L-E).

No safety recommendations will be issued that aim to address all of the questions involving a more equitable allocation of rest time (L-E), improved procedures (L-S), more efficient locations of work posts (L-E and L-H), improved integration of ATC support systems (L-H), and improved training (L-S). This is because these questions were already addressed by ENAIRE during the investigation and resolved to this commission's satisfaction.

Finally, it should be noted that the crew of UTA5187 also acted correctly when they noticed the potential hazard, despite being some distance away, since they did not know what the intentions of the crew of ARG1163 were and their response posed the least hazard to the safety of the operation.



### 3. CONCLUSIONS

#### 3.1. Findings

- The Barcelona Airport operates using two different configurations every day, one during the day (07:00-23:00) and another at all other times. This is due to concerns involving noise pollution and its effects in certain areas of nearby towns.
- During the daytime or nighttime interval, operations are carried out in different configurations, depending on the wind.
- On 27 May 2012 at 07:00, there was a similar incident involving two aircraft that was investigated by the CIAIAC (IN-021/2012), which issued the following two recommendations:

**REC 29/13:** It is recommended that AENA (now ENAIRE) modify the Training Plan for the Barcelona tower so as to guarantee that a minimum amount of time is spent during the practical training periods in each and all of the preferred airport configurations as well as in changing configurations before a controller receives the unit endorsement.

The status of this recommendation is OPEN, REPLY SATISFACTORY. IN PROGRESS. The CIAIAC is awaiting for ENAIRE to provide proof before closing it.

**REC 30/13:** It is recommended that AENA (now ENAIRE) modify the Barcelona tower Qualification Plan so as to guarantee that a minimum amount of on-duty time is spent in each of the preferred airport configurations as well as in changing configurations as a requirement for tower controllers to maintain their operational proficiency.

The status of this recommendation is OPEN, REPLY SATISFACTORY. IN PROGRESS. The CIAIAC is awaiting for ENAIRE to provide proof for evaluation.

- The airplane with callsign ARG1163 was making a flight at a time different from its usual schedule. It had planned to take off while the airport was operating in the nighttime configuration.
- The airplane with callsign ARG1163 requested to take off from the non-preferred runway, which is normally used for landings.
- During engine start-up and while taxiing, the crew were informed they would take off from runway 07L. They were later told they would be taking off from runway 25R. The thresholds of these two runways are at opposite sides of the airport.
- At 06:00, the South tower began operations and the controller in charge of all ground movements at the airport from the East tower transferred North and Central Ground to the controller who was going on duty in the South tower.

- At 06:29, a controller went on duty in the South tower who took over Central Ground, leaving North Ground under the control of the controller who had been in charge of both since 06:00.
- At 06:40, the supervisor told the Central-North Ground controller that “there are no arrivals”. The controller acknowledged without using standard phraseology (using the word “ok”).
- At 06:43, the supervisor told the Central-North controller that the last traffic was a EUROTRANS aircraft. The controller again acknowledged with the same word (ok), using ambiguous phraseology.
- At 06:49, there was an intermittent conversation between the South Ground controller and the Central Ground controller to hand off airplane ARG1163, but the latter was not informed that there were two airplanes inbound on runway 02.
- At 06:50, the airplane with callsign ARG1163 was cleared to cross runway 02 by the Central Ground controller.
- At 06:52, when the crew of ARG1163 asked confirmation upon seeing the M5 stop bars were turned on, they were turned off by the Central Ground controller. At the same time, the airplane with callsign UTA5187 executed a go around at runway 02.

### 3.2. Causes/Contributing factors

The investigation has concluded that the incident was caused by a series of mistakes made at various control posts that were not detected in time due to a lack of coordination and due to the fact that they occurred during the nighttime to daytime runway configuration change that takes place at the airport every day at 07:00.

Contributing to the incident is the fact that the flight of the airplane with callsign ARG1163 was not scheduled at its usual time, and that the takeoff was from a non-preferred runway, which forced it to cross the active runway on three occasions.

#### 4. SAFETY RECOMMENDATIONS

The investigation identified a number of areas for improvement and that would normally be the subject for safety recommendations.

In the end no recommendations will be issued since during the course of the investigation, both AENA and ENAIRE showed that they had already implemented the measures that would have been requested in the recommendations.

The recommendations that were going to be issued are given below for information purposes only.

- It is recommended that AENA analyze the possibility of changing the parking stands allocated to larger aircraft so as to minimize the number of times these aircraft must cross the runways en route to the thresholds for takeoff.
- It is recommended that ENAIRE establish mechanisms to physically prevent someone other than the Local Controller from being able to operate the stop bar lights for the active runway.
- It is recommended that ENAIRE review the location of all the control posts to ensure that the local controller has an unimpeded view of all the intersections where the various taxiways cross the active runway.
- It is recommended that ENAIRE study the possibility of integrating the lighting display system into the Automated Air Traffic Control System (SACTA).
- It is recommended that ENAIRE modify the Training and Qualification Plans for the Barcelona Tower to include specific training for supervisors to underscore the importance of proper coordination, in keeping with procedures, during the nighttime to daytime runway configuration changes at the Barcelona-El Prat Airport.
- It is recommended that ENAIRE analyze the possibility of having only the Supervisor sectorize each post, instead of letting the controllers sectorize their own posts before going on watch.
- It is recommended that ENAIRE modify the Training and Qualification Plans for the Barcelona Tower to include specific training for air traffic control personnel to underscore the importance of proper use of standard aeronautical phraseology during communications.

