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AVIACIÓN **C**IVIL

Technical report IN-005/2005

Serious incident of aircraft Tupolev 154M, registration RA-85644, operated by Aeroflot, at Barcelona Airport (Spain), on 27 February 2005

MINISTERIO
DE FOMENTO

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SECRETARÍA GENERAL DE TRANSPORTES

COMISIÓN DE INVESTIGACIÓN 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 and its causes and consequences.

In accordance with the provisions of Law 21/2003 and Annex 13 to the Convention on International Civil Aviation, the investigation has exclusively a technical nature, without having been targeted at the declaration or assignment of blame or liability. The investigation has been carried out without having necessarily used legal evidence procedures and with no other basic aim than preventing future accidents.

Consequently, any use of this report for purposes other than that of preventing future accidents may lead to erroneous conclusions or interpretations.

This report has originally been issued in Spanish language. This English translation is provided for information purposes only.

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Abbreviations

00 °C	Degrees Celsius
ACC	Area Control Center
AENA	Aeropuertos Españoles y Navegación Aérea (Airports and Air Navigation Service provider)
AIP	Aeronautical Information Publication
ATC	Air Traffic Control
APP-H	Approach sector controller
CIAIAC	Comisión de Investigación de Accidentes e Incidentes de Aviación Civil (Aircraft Accident Investigation Commission)
CRM	Crew Resource Management
CVR	Cockpit Voice Recorder
DGAC	Dirección General de Aviación Civil (Spanish Aeronautical Authorities)
DME	Distance Measure Equipment
FDR	Flight Data Recorder
FINAL	Final sector controller
ft	Feet
ICAO	International Civil Aviation Organization
ILS	Instrumental Landing System
kt	Knots
km/h	Kilometer per hour
LIH	Light Intensity High
m	Meter
METAR	Meteorological report
MHz	Megahertzs
NOTAM	A notice containing information concerning the establishment, condition or change in any aeronautical facility, service, procedure or hazard, the timely knowledge of which is essential to personnel concerned with flight operations
PAPI	Precision Approach Path Indicator
PF	Pilot Flying
PNF	Pilot Not Flying
TWR	ATC Control Tower
TWR GNC	Ground Control Tower controller
TWR LCL	Local Control Tower controller
UTC	Coordinated Universal Time
VASI	Visual Approach Slope Indicator
VMC	Visual Meteorological Conditions
VOR	Very High Frequency Omnidirectional Radio Range
W	Departure sector controller

Synopsis

The incident took place on 27th February 2005. CIAIAC was aware of the notification in the morning on 28th February 2005. The delay in acknowledgement of the ocurrence by CIAIAC was because of the communication system used by AENA (airport services provider) (email) instead telephone, which is the only means to ensure a 24 hour service available for notification purposes. CIAIAC informed AENA of this fact and a new notification procedure has been established.

The day of the incident the crew informed ATC authorities and the pilot in command wrote down a statement about the event. During the afternoon Barcelona airport services informed CIAIAC, by email, that an aircraft had landed on taxiway «T» on 27th February 2005. After the incident, the aircraft flew back to Moscow since it did not have any damage and the crew thought the authorities had been informed. Therefore the flight recorders could not be recovered. The Federal Transport Oversight Authority (Russian Federation Authority for air incidents investigation) was notified as State of Design, Registration and of Operation of the aircraft and an accredited representative was appointed. Technical support was obtained from Aeroflot.

On 27 February 2005, the aircraft took off from Moscow at 08:10 hours. After an uneventful flight to Barcelona it began a non-precision VOR-DME approach to runway 25R. The captain decided to go around. It performed a second approach to runway 25R. Finally the aircraft landed on taxiway «T» instead of runway 25R. During the landing roll the controller informed that they were landing on taxiway «T».

No passenger or crew member suffered any injury. The aircraft did not sustain any damage. After the landing, aircraft taxied to the parking. The weather was good, with VMC (Visual Meteorological Conditions) conditions prevailing.

After the investigation it was establish that the incident probably happened because the flight crew mistook taxiway «T» for runway 25R mainly due to a poor preparation of the flight.

Date of approval: June, 21st 2006.

1. FACTUAL INFORMATION

1.1. History of the flight

The aircraft, a Tupolev 154M, registration RA-85644, took off from Sheremetyevo Airport (in Moscow) for Barcelona at 8:10[1] on 27th February 2005. The flight was uneventful. During the descent, ATC Approach unit (FINAL) instructed the crew to reduce the speed. After being directed to TEBLA point, the aircraft started the non precision VOR/DME approach to runway 25R. It was transferred to LCL TWR (Local Control Tower). There was a preceding traffic and the TWR informed the crew of the Tupolev that it was 2,5 miles ahead maintaining 120 knots of ground speed.

The crew copied the information and adjusted the speed. Finally at 12:31:08 the aircraft was cleared to land. At 12:31:25 a Lufthansa aircraft informed ATC that they have vacated the runway. At 12:31:36 the Tupolev crew informed they were making a missed approach. LCL TWR gave them instructions to carry out the go around maneuver and to contact the departure controller.

After that, at 12:32:53, the marshaller contacted LCL TWR asking what had happened with the Tupolev 154. LCL TWR answered they did not know it.

Meanwhile TWR contacted the departure controller by hot line and asked her to interrogate the aircraft about the missed approach. Departure controller could not ask the Tupolev flight crew because they had already selected approach sector frequency.

The aircraft performed the maneuver and contacted LCL TWR again at 12:41:47. LCL TWR asked them about the reason of the missed approach. The aircraft answered that there was an aircraft on the runway and specified it was a German aircraft.

At 12:45:04 the aircraft was cleared again to land on runway 25R. At 12:46:30 the aircraft was informed it had landed on taxiway «T». There were no aircraft on taxiway «T». Taxiway «T» is parallel and on the right of runway 25R.

Then the aircraft turned by gate «G» and ATC instructed it to follow the marshaller to the assigned parking position.

LCL TWR asked the following landing aircraft if the lights on the runway were on and it answered they were.

[1] Time reference in this report is Coordinated Universal Time (UTC) unless otherwise stated. It is necessary to add one hour to obtain the local time.

Photo 1. Aircraft approaching to taxiway T at the time a Dash-8 is leaving the taxiway T (photo by a private observer outside the airport premises)

Photo 2. Aircraft landing on taxiway T (photo by a private observer outside the airport premises)

The runway configuration was:

— 25R for landing.
— 20 for take off.

VMC conditions were prevailing at the time of the incident. Neither damage to the aircraft nor injuries to the passengers or crew were reported.

1.2. Injuries to persons

Injuries	Crew	Passengers	Total in the aircraft	Others
Fatal				
Serious				
Minor				Not applicable
None	9	86	95	Not applicable
TOTAL	**9**	**86**	**95**	

1.3. Damage to aircraft

It was made an inspection after the aircraft flew back to Moscow and no damage or faults were found.

1.4. Other damage

Not applicable.

1.5. Personnel information

According to the information provided by the operator, during the incident flight the pilot in command was the Pilot Flying (PF), the copilot was in charge of the communications (PNF) and all crew members had the head-phones on.

1.5.1. *Pilot in command*

Sex, Age:	Male, 52
Nationality:	Russian
License:	Pilot instructor III (issued 22-09-1997, valid until 01-02-2006)

Medical check:	AA (valid until 01-02-2006)
Total flight time:	14,358 h
Hours on the type:	6,820 h (4,870 h as captain)
Hours in the last 24 hours:	5:40 h
Hours in the last 30 days:	60:00 h
Hours in the last 60 days:	128:00 h
Hours in the last 90 days:	194:00 h
Rest period before duty:	17:35 h
Start time of duty period:	07:10 h

The operator stated that the captain had flown 28 times to Barcelona airport, last time on 12-02-2005, fifteen days before the incident.

The pilot stated that he thought he was landing on runway 25R and he thought that the lights he could see on the left belonged to runway 25L. He said that lights of runway 25R were out of service because of the construction works in the vicinity of runway 25R.

1.5.2. *Copilot*

Sex, Age:	Male, 38
Nationality:	Russian
License:	II(issued 15-02-1999, valid until 18-03-2005)
Medical check:	AA (valid until 18-03-2006)
Total flight time:	2,815 h
Hours on the type:	1,710 h
Hours in the last 24 hours:	5:40 h
Hours in the last 30 days:	59:00 h
Hours in the last 60 days:	92:00 h
Hours in the last 90 days:	151:00 h
Rest period before duty:	20:15 h
Start duty period time:	7:10 h

The operator stated that the copilot had flown 5 times to Barcelona Airport, the last one on 1-02-2005, twenty six days before the incident.

The copilot said they were reducing speed constantly and the captain had warned them about of the possibility of making a go around because of the high intensity of the air traffic.

1.5.3. *Navigator*

Sex, Age:	Male, 57
Nationality:	Russian
License:	Navigator License II (issued 20-01-1998, valid until 01-02-2006)
Medical check:	AA (valid until 01-02-2006)
Total flight time:	16,020 h
Hours on the type:	11,970 h
Hours in the last 24 hours:	5:40 h
Hours in the last 30 days:	54:00 h
Hours in the last 60 days:	122:00 h
Hours in the last 90 days:	187:00 h
Rest period before duty:	20:15 h
Start duty period time:	7:10 h

The operator stated that the navigator had flown 5 times to Barcelona Airport, the last one on 01-02-2005, twenty six days before the incident.

1.5.4. *Flight Engineer*

Sex, Age:	Male, 45
Nationality:	Russian
License:	Flight Engineer License III (issued 20-10-1999, valid until 17-03-2005)
Medical check:	AA (valid until 17-03-2005)
Total flight time:	6,910 h
Hours on the type:	6,910 h
Hours in the last 24 hours:	5:40 h
Hours in the last 30 days:	55:00 h
Hours in the last 60 days:	123:00 h

Hours in the last 90 days:	189:00 h
Rest period before duty:	17:35 h
Start duty period time:	7:10 h

No information about previous flights of the flight engineer to Barcelona Airport is available.

1.6. Aircraft information

1.6.1. *Airframe data*

Manufacturer:	Tupolev
Model:	154M
Serial number:	88A780
Registration:	RA-85644
MTOW:	100,000 kg
Operator:	Aeroflot
Year of delivery:	1988
Total flight time:	31,658
Total flight cycles:	11,641
Number engines:	3
Engine (type and model):	D-30KU-154

1.7. Meteorological information

The METAR for Barcelona Airport on the 27th February 2005 at 12:30 h showed:

— Wind: 190°/08 kt.
— Visibility: 9,999 m.
— Clouds: Few at 2,500 ft.
— Temperature: 10 °C.
— No significant changes expected.

The METAR for Barcelona Airport on the 27th February 2005 at 13:00 h was:

— Wind: 210°/10 kt.
— Visibility: 9,999 m.

— Clouds: Few at 2,500 ft.
— Temperature: 11 °C.
— No significant changes expected.

This information indicates that VMC prevailed during the approach and go around of the aircraft.

1.8. Aids to navigation

According to NOTAM information:

— Runway 25R ILS was out of service since 25-02-2005.
— Runway 25R PAPI was out of service since 21-02-2005.
— Runway 25R touchdown zone lights had been reduced to 360 m since 11-02-2005.
— Runway 25R approach lights had been reduced to 690 m since 11-02-2005.

After being directed to TEBLA point, the aircraft performed a non precision VOR/DME approach maneuver, which utilizes lateral guidance but does not utilize vertical guidance.

Some NOTAMS informed that there were people and mobile machinery working at both sides of runway 25R.

During the landing maneuver of the Tupolev the runway 25R approach light system was on, worked properly according to the limitation defined in the NOTAM and no malfunction was reported.

1.9. Communications

During the first approach, go around and subsequent second approach the aircraft held communications with five different frequencies: Local Control Tower (TWR LCL), Ground Control Tower (TWR GNC), departure sector (W), approach sector (APP-H) and final sector (FINAL).

1.9.1. *First approach*

For the first approach the Tupolev aircraft was informed that the preceding traffic was 2.5 miles ahead and maintaining 120 kt. At this moment the Tupolev airspeed was 150 kt, approximately. According to the statements of the crew the captain said there was a possibility of performing a missed approach.

At 12:31:08 the aircraft was cleared to land on runway 25R. At 12:31:36 the aircraft communicated it was carrying out a missed approach. Eleven seconds earlier, at 12:31:25, the preceding aircraft reported runway 25R vacated.

TWR LCL informed the aircraft about the missed approach maneuver and instructed it to call 127.7. Neither the aircraft nor the TWR talked about the reason for the go around.

1.9.2. *Go around*

TWR LCL asked departure sector W to enquire the aircraft about the reason for going around. Sector W couldn't interrogate the aircraft because it had already changed the frequency.

The reason for this unintended change of frequency was that the W controller called the Tupolev and when it answered without saying the call sign at the end, W controller gave instructions of descending and changing the frequency to another aircraft (see communication at 12:33:32 on the table below). The Tupolev misunderstood the instruction of changing the frequency and selected 126.5 (APP-H according to the AIP).

APP-H vectored the aircraft to turn left heading 070° and instructed to maintain 4,000 ft. After that APP-H controller gave the Tupolev a new frecuency, 119.1 (FINAL). The communications between the Tupolev and W controller, and the Tupolev and APP-H are reproduced below:

Hour	Channel	Station	Text
12:32:07	Hot line	W	Cuando puedas de TMA Whisky («Please, from TMA Whisky»)
12:32:12	Hot line	FINAL	Dime («Go ahead»)
12:32:14	Hot line	W	El Aeroflot se va al aire, dice la torre que me lo pasa en dos tres... en el radial dos tres ocho y cuatro mil, ¿Me dirás cuando te vale y cómo te vale? («The Aeroflot is going around; tower says they are taking him in two, three... in radial two three eight and four thousand. Will you tell me when you want him and how you want him?»)
12:32:21	Hot line	FINAL	A mí me vale a la izquierda a tu discreción con los despegues parados a tres mil («To me it is enough to the left at your discretion, with the take offs stopped at three thousand»)
12:32:24	127.7	AFL297	Barcelona buenas tardes, Aeroflot two nine seven going around again
12:32:30	127.7		Aeroflot two nine seven Barcelona?

Hour	Channel	Station	Text
12:32:30	Hot line	TWR LCL	Probablemente por la altitud porque se ha ido sin decir nada («Probably because of the altitude, because he went off without saying anything»)
12:32:33	127.7	AFL297	Aeroflot two nine seven climbing four thousand go around again
12:32:36	127.7	W	Aeroflot two nine seven to four thousand feet QNH one zero zero eight
12:32:38	Hot line	FINAL	Los despegues parados a tres mil («Takeoffs stopped at three thousand»)
12:32:41	127.7	AFL297	Four thousand feet, one zero zero eight Aeroflot two nine seven
12:32:50	Hot line	W	¿Puedes de TMA Whisky? («Do you read me from TMA Whisky»)
12:32:52	Hot line	TWR LCL	Hola, dime («Hello, go ahead»)
12:32:54	Hot line	W	El Aeroflot sube para cuatro mil cuando haya librado tres, ¿lo podría cruzar del QMS de la veinte y me los sacas sólo para tres mil? («The Aeroflot climbs for four thousand; when it has cleared three thousand, could I cross it from the QMS of two zero and you take them out only for three thousand?»)
12:32:57	Hot line	TWR LCL	Vale, si ya me lo ha dicho tu compañera que los despegues a tres mil, perfecto... Pregúntale por qué, porque a mí no me ha dicho por qué se ha ido («Ok, yes, your fellow already told me that takeoffs should go to three thousand, Ok... ask them why, because they did not tell me why they went around»)
12:33:05	Hot line	W	Vale («Ok»)
12:33:08	Hot line	FINAL	Víralo ya a rumbo noventa y ya está («Turn it to heading ninety and that's it»)
12:33:11	127.7	W	Aeroflot two nine seven I confirm four thousand QNH one zero zero eight and turn left on heading zero nine zero
12:33:14	127.7	AFL297	Thank you, over to zero nine zero maintain four thousand feet QNH one zero zero eight Aeroflot two nine seven
12:33:27	127.7	W	¿Aeroflot two nine seven, Barcelona?
12:33:31	127.7	AFL297	Go ahead madam
12:33:32	127.7	W	Skyjet four eight nine Papa descend flight level eight zero call approach one two six decimal five good bye
12:33:41	127.7	AFL297	Two six decimal five for Aeroflot two nine seven
12:33:47	127.7	W	Aeroflot two nine seven maintain this frequency just to confirm which is... which is the reason why you made a
			missed approach?

Hour	Channel	Station	Text
12:34:20	127.7	W	Aeroflot two nine seven?
12:34:24	127.7	W	Aeroflot two nine seven Barcelona?
12:34:31	Hot line	W	Dime si te ha llamado el Aeroflot («Tell me whether the Aeroflot has called you»)
12:34:33	Hot line	APP-H	Sí («Yes [it has]»)
12:34:34	Hot line	W	Vale («Ok»)
12:33:41	127.7	AFL297	Two six decimal five for Aeroflot two nine seven
12:33:46	126.5	AFL297	Barcelona... AFL297 left turn 090 maintain 4000
12:33:54	126.5	APP-H	AFL297... turn left heading 070
12:33:59	126.5	AFL297	Left heading 070 AFL297
12:36:05	126.5	APP-H	AFL297 CALL final 119.1
12:36:12	126.5	AFL297	119.1 AFL297

FINAL controller (frequency 119.1 MHz) did not ask the aircraft for the reason of the go around and he cleared it to perform the VOR/DME 25R approach.

1.9.3. *Second approach and landing*

The aircraft called LCL TWR again at 12:41:47 and LCL TWR queried it about the go around. The crew answered that there was an aircraft on the runway, and added that it was a German aircraft. LCL TWR did not query anything else about that fact. On her statement after the incident, the controller said that runway 25R was vacated when she cleared the Tupolev 154 for landing at the first time.

Both controllers, LCL TWR and GNC TWR said in their statements that they cannot appreciate the relative position of an aircraft with respect to the center line of runway 25R during the approach.

At 12:45:04 LCL TWR cleared the aircraft to land on runway 25R.

At 12:45:34 the marshaller informed GNC TWR the aircraft was landing on taxiway «T».

At 12:45:46 another aircraft informed the Tupolev 154 had landed on taxiway «T». That aircraft, a DASH-8, had only just vacated the taxiway «T».

LCL TWR informed the Tupolev 154 crew that they had landed on taxiway T and requested them to call 121.7, GNC TWR frequency.

GNCTWR instructed the Tupolev 154 to taxi via «H» gate and «S» following the marshaller.

LCL TWR queried an aircraft which landed after the Tupolev 154 about the approach lights. The aircraft informed back that they were on.

1.9.4. *Radar information*

According to radar information provided by the ACC the runway was vacated by the Lufthansa aircraft just when the Tupolev 154 was initiating the go around.

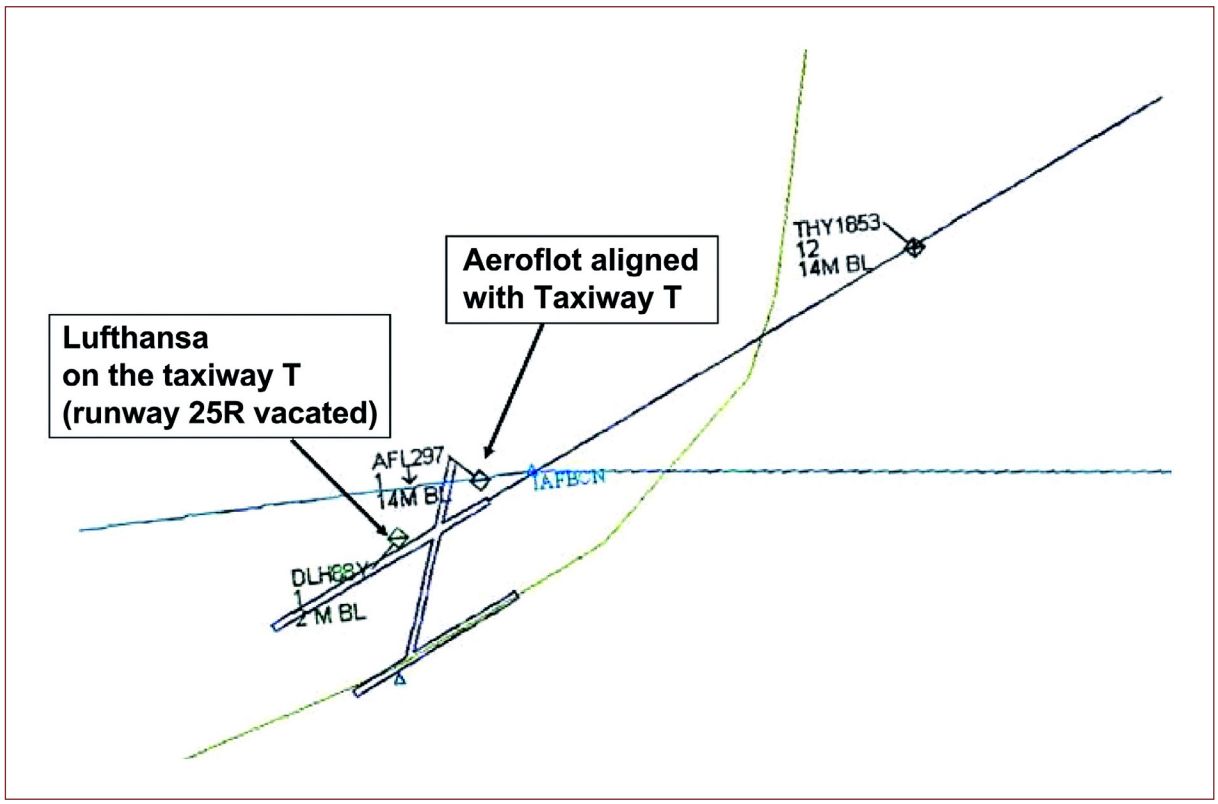

Photo 3. Radar information at 12:31:43 when the Aeroflot was initiating the go around

1.10. Aerodrome information

1.10.1. *General*

Barcelona Airport is a major international airport with two parallel runways, 25R-07L and 25L-07R, and another runway 02-20 that crosses the first one. The day of the incident the runway configuration was 25R for landing and 20 for take off.

1.10.2. *Marking and lighting*

According to the Aeronautical Information Publication (AIP) of Spain, dated 25 November 2004, Runway 25R of Barcelona Airport had 247° magnetic heading and its dimensions were 3,552 × 45 m. It was made of asphaltic concrete. The runway markings are:

— Designation or number markings.
— Threshold marking.
— Center line marking (as can be seen in the picture n° 3 these markings are not easily appreciated).
— Aiming point marking.
— Touch-down zone marking.
— Side stripe marking.

The approach and runway lighting of runway 25R are:

— Approach: precision CAT II/III, 720 m LIH.
— PAPI: 3°.
— Threshold.
— Touch-down zone 900 m.
— Runway center line.
— Runway edge.
— Runway end.
— Lighting rapid exit indicator (G-A, H-A, C-B, E-B).

The taxiway T is parallel to runway 25R and on the right. It is 30 meters width and it is made of asphalt. The taxiway markings are edge and centre marking.

The lighting of taxiway T are:

— Edge.
— Centerline.

The distance between the taxiway and runway centrelines is 250 meters. Photo 4 (taken in March 2005) shows the appearance of runway 25R and taxiway T.

There were construction works being carried out on the both sides of runway 25R on the days previous to the incident according to the NOTAM's in force on the incident day. Because of these construction works, the ILS and PAPI of runway 25R were out of service. Besides, the touch-down zone lights were reduced to 360 m and the approach lights were reduced to 690 m.

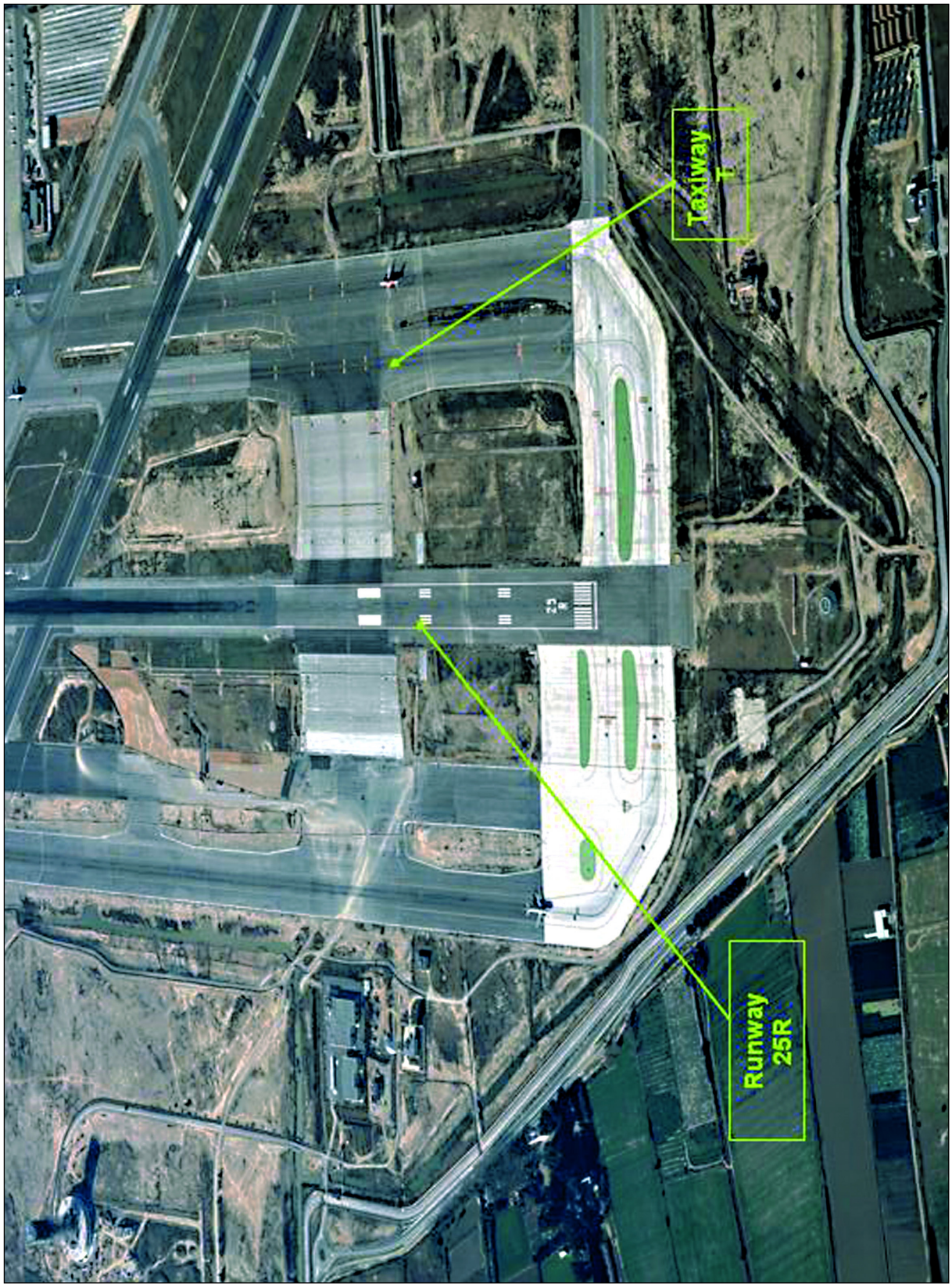

Photo 4. Runway 25R and taxiway T

1.11. Flight recorders

1.11.1. *Cockpit voice recorder*

The aircraft had a cockpit voice recorder (CVR) MARS-BM, s/n 279018. It records the last 30 minutes of operation.

The CVR information was unavailable because it was overrecorded after the flight back to Moscow on the day of the incident.

1.11.2. *Radio-communication recorder*

The aircraft had a radiocommunication recorder MS-61B, s/n 933147. It records the radio-communications during the last 5 hours 30 minutes.

The 30 minutes previous to the incident were submitted for analysis on the basis of radio-communication recorder transcript. This transcript reproduces the communications maintained with the ATC facilities of the ACC (Area Control Center) Barcelona and Control Tower of Barcelona.

1.11.3. *Flight data recorder*

The aircraft was equipped with a flight data recorder (FDR) MCPII-64M6, s/n 70428. It records at least 25 h of flight.

The recorder was immediately recovered when the aircraft flew back to Moscow and it was downloaded at the AEROFLOT laboratory in Moscow.

This laboratory provided information about the go around (4 minutes before the go around) and landing (6 minutes before the landing).

1.11.3.1. Go around. Relevant flight parameters

The analyzed parameters were radioaltitude, indicated airspeed, normal acceleration, pitch angle, elevator (left), aileron (right), low pressure compressor, roll angle, stabilizer and flaps.

When the go around was initiated there was an altitude over ground of 37 m (120 ft) and the airspeed was 284 km/h (153 kt). The aircraft descended down to 22 m (72 ft) and immediately began to climb. An increase of pitch angle was observed. No anomalies were identified during the maneuver.

1.11.3.2. Landing. Relevant flight parameters

From the study of the available parameters during the approach, it is observed that the mean rate of descent is around 450 ft/min. The maximum normal acceleration is 1,40 g. During the approach the airspeed varied between 294 km/h (158 kt) and 281 km/h (151 kt). No anomalies were identified during the maneuver.

1.12. Wreckage and impact information

The aircraft was inspected after it flew back to Moscow and the results were okay.

1.13. Survival

The disembarking was done normally when the aircraft parked on T102.

1.14. Tests and research

1.14.1. *Barcelona Control Tower assessment visit*

During the investigation, the Barcelona TWR was visited to asses the position of the LCL TWR controller and the radar information display.

It was confirmed that from the TWR is very difficult to identify if the landing aircraft is aligned with the taxiway «T» or the runway 25R.

In addition, a reproduction of the radar information was performed. The scale and the monitor size were the same that LCL TWR controller used.

According to this test, it is concluded that it is unlikely the LCL TWR controller noticed if the aircraft was approaching taxiway «T» or runway 25R.

1.15. Additional information

1.15.1. *Pre-flight preparation procedure*

According to the pre-flight preparation procedure of the Operations Manual:

> «Captain is responsible for organization and fulfillment of pre-flight preparation of crew prior to each flight with regard to ATC restrictions and meteorological conditions.»

«Captain during pre-flight preparation shall:

Receive the certification and briefing of airplane's airworthiness, information of departure, destination and alternate aerodromes condition, aeronautical information about airports and airways concerned, commercial load expected, presence of dangerous goods on board...»

«Co-pilot during pre-flight preparation shall:

— Study meteorological and aeronautical information...»

«Flight Navigator during pre-flight preparation shall:

— Study meteorological and aeronautical information;
— Receive update navigation bag which includes aeronautical information documents in case of the flight crew is without radio-operator...»

The pre-flight preparation of the crew includes an operational briefing given by the Flight Dispatcher. During the operational briefing the following information is handed over to the flight crew by the Flight Dispatcher or authorized representative:

— «NOTAM applicable to destination aerodrome...»

1.15.2. *Landing briefing*

According to the Operations Manual:

«Take-off and landing briefings shall be carried out by the Pilot Flying (PF) so that all flight crew members are aware of the specific details of the most important flight stages. The primary purposes of the briefings are:

— Formulation by the PF of the main parameters of the procedure to be carried out
— Discussion of the prospective course of actions and optimum crew co-operation
— Check of serviceability of operational equipment to be used for the intended procedure
— Development and discussion of the related task sharing and alternate crew actions in the event of abnormal conditions (including emergency...»

«Approach briefing shall include the following items:

— Active runway expected for landing, runway surface condition, friction coefficient and braking action, the status of the ground lighting facilities available,

visual approach slope indicator (VASI), runway marking, runway length and width, displaced thresholds if any, taxiways and holding bays...»

1.15.3. *Flight crew mission on board*

According to the information provided by the company, the roles or mission of the different flight crew members on board were:

PIC (Pilot in command):

— Supervise fulfillment of flight crew duties
— Act as PF (Pilot flying) or check piloting performed by co-pilot
— Control autopilot
— Carry out pre-flight and pre-landing briefings of the crew

Copilot:

— Perform communications
— Carry out checking control of the plane or piloting under supervision of PIC
— Monitor navigation

Navigator:

— Carry out navigation
— Perform communications (at cruising level)
— Monitor flight performance data

Flight Engineer:

— Supervise the operation of the engines and monitor the engines and aircraft systems

During the flight the PIC was the PF, the copilot performed the radio communications and all crew members were wearing the head phones on.

1.15.4. *Pilot statements*

Several pilots who landed in Barcelona airport some minutes before the Tupolev 154 were interviewed. From their point of view there were not abnormal conditions that day.

They stated there was appropriate marking on the runway and visual meteorological conditions prevailed.

2. ANALYSIS

2.1. General

From the information above it is deduced that Tupolev 154 tried to land on taxiway T but the taxiway was occupied and it performed a go around. After the first failed attempt it finally landed on that taxiway T.

According to the available parameters of the FDR both approaches were stable.

2.2. First approach

During the first approach the crew was advised to reduce the speed, so the captain thought the probability of a go around was very high and therefore he advised the other flight crew members.

The last flight of the captain to Barcelona took place on 12th February 2005 and that day the ILS of runway 25R was working. Therefore, on 27th February 2005, with the ILS and the PAPI out of service, there was new scenario for the crew and particularly for the captain. The VOR/DME approach is a non precision approach and the horizontal guide is not so precise as in an ILS approach.

In addition, both the flight crew and the captain said in their statements that the approach lights of runway 25R did not work (actually the approach lights had been reduced to 690 m and they were working). Then, when they saw the approach lights on, they probably had a tendency to think that they were from runway 25L.

There is a requirement to studying the NOTAMS applicable for the destination aerodrome as well as the status of the lighting facilities available on the pre-flight procedure and landing briefing. The crew firmly believed the approach lights did not work, as they said in their statements. Therefore it is obvious that some information was missed during the course of the preparation of flight or during the landing briefing.

They may also have been lulled into thinking that the approach was normal, despite the minimal marking on the selected landing area because they knew that construction works were being carried out in the proximity of runway 25R.

When the captain saw an aircraft on the selected landing area after the Tupolev was cleared to land, he though that one of the possibilities he had considered had happened and immediately carried out a go around. This action of the captain is considered appropriate.

It should be pointed out that the crew did not mention that an aircraft was on the runway right away. If the crew had notified the fact than an aircraft was on the runway during their approach there had been an opportunity to avoid the later mistake.

The LCL TWR controller could not appreciate that the aircraft was approaching to taxiway «T» because the perspective from the Control Tower does not allow to distinguish it. Besides, the LCL TWR was in charge of arrivals and departures and the workload was high at that moment.

Additionally, the proximity of the runway and taxiway made it unlikely that the LCL TWR controller could differentiate, using radar, between an aircraft approaching the taxiway or the runway.

2.3. Go around

The communications held between the Tupolev and different controllers are included in paragraph 1.9.2 above.

After the go around, the Tupolev was transferred to W controller. The LCL TWR controller asked W controller to inquire the Tupolev about the reason for the go around.

There was a misunderstanding during the communication and the Tupolev changed the frequency before it could be interrogated about the go around.

The reasons of the misunderstanding was that the controller called the Tupolev and when the Tupolev called back without saying its call sign, the W controller gave an instruction to another aircraft. The Tupolev crew presumably did not understand the complete message and, as they were expecting instructions from the controller, they understood the message was addressed to themselves.

This misunderstanding precluded the W controller from asking the Tupolev. The second opportunity of avoiding the mistake was also lost.

2.4. Second approach

When the crew performed the second approach they had in their mind a scene which was very difficult to change. Once a false assumption is made it is often not easy to correct it. Perhaps the most dangerous characteristic of a false hypothesis is that it is frequently extremely resistant to correction. It is easy to adopt it and very difficult to relinquish it despite evidence or verbal inputs contradict the false hypothesis.

There were no markings on the selected «runway» (taxiway T) but anyway the captain landed on it because he was totally convinced that he was landing on runway 25R.

In this approach LCL TWR controller asked the Tupolev about the reason of going around. The first time the Tupolev did not understand and the controller asked again. The Tupolev informed it was because there was an aircraft on the runway.

LCL TWR controller did not do anything. Probably she did not know what had exactly happened because the scene had changed since the time the go around took place and she could not guess that the Tupolev had tried to land on taxiway T. The high workload possibly contributed to this lack of situational awareness.

In the flight crew statements the four people on board, stated they were totally convinced that they were landing on runway 25R. This fact could denote the strict hierarchy in the cockpit.

According to the description of flight crew mission on board, the captain is not supervised by anyone when he acts as pilot flying and nobody supervises the copilot communications. A pyramidal supervision is established and the crew member on the top is not monitored by other crew members.

This philosophy is not in line with the CRM philosophy that highlights the benefits of mutual cross-check and back-up.

Another factor which shows no CRM philosophy adherence is that crew did not request clarification when they had to perform the go around and probably that fact would have avoided the mistake.

A deeper study of the cockpit environment and the workload distribution during the actual approaches was not possible because the CVR was not recovered.

Another aspect which should be observed is the communication problems. During the go around the Tupolev assumed an instruction addressed to another aircraft. And when the aircraft was carrying out the second approach LCL TWR controller had to ask twice about the reason for the go around.

It may indicate that there was not fluent communication between ATC and aircraft crew.

On the other hand, during the communications controllers use both English, with international flights, and Spanish, with domestic flights. This fact prevents the different crew members from achieving an adequate situational awareness.

In particular, if during the second approach the Tupolev crew would have known that the preceding aircraft (a Spanish aircraft) was landing on the same runway that it was cleared to land, the crew could have followed it and could have avoided the mistake.

In relation to this matter, a safety recommendation was issued the year 2003 by the CIAIAC in the final report of the incident IN-060-2002. It is said:

REC 25/03. It is recommended that a working group is established with participation of the DGAC, AENA and representatives of the operators, pilot professional associations and air traffic controllers professional associations, that studies the possibility of regulating the use of English language only at major international airports whenever a non-Spanish speaking pilot is involved, and the conditions of the corresponding implementation of that regulation.

3. CONCLUSIONS

3.1. Findings

— There was no evidence of anomalies on the aircraft before or after the incident.
— No malfunction of any aircraft system was noticed during the flight.
— The flight crew had valid licenses and were adequately qualified for the flight.
— There was no evidence that incapacitation or physiological factors affected the flight crew performance.
— The crew did not know the approach lights of runway 25R were operational and on.
— The ILS of runway 25R was out of service.
— The marking on runway 25R was in accordance with Annex 14 of ICAO.
— The aircraft did an approach to taxiway T of Barcelona airport.
— ATC did not notice the aircraft was aligned to taxiway T instead of runway 25R.
— The aircraft performed a go around because there was an aircraft on taxiway T.
— The flight crew did not ask ATC to clarify why there was an aircraft on the selected landing area.
— The aircraft performed the second approach to taxiway T.
— The aircraft landed on taxiway T.

3.2. Causes

It is considered that the incident probably happened because the crew of the aircraft mistook taxiway T for runway 25R due to a lack of pre-flight preparation which made the crew unaware of the actual scenario at Barcelona airport (construction works, ILS and PAPI out of service, approach lights reduced to 690 m, touchdown zone light reduced to 360 m). A contributory factor was the non adherence to CRM philosophy when the crew did not ask for clarification after the first go around.

4. SAFETY RECOMMENDATIONS

The following safety recommendations are issued as a result of the investigation:

REC 14/06. It is recommended to Aeroflot that action is taken to review the application of the preflight preparation procedure to assure that the most updating information is adequately taken into account.

REC 15/06. In view of the contribution of Crew Resources Management (CRM) practices to the improvement of air safety, it is recommended to Aeroflot that supports the implementation of CRM practices in the company and among the crews.