



MINISTRY OF INFRASTRUCTURE

STATE COMMISSION ON AIRCRAFT ACCIDENTS INVESTIGATION

Final Report

Serious incident

occurrence No. 344/07

**Simultaneous beginning of take off by the crews of Boeing
737 (OM-NGF) and Boeing 767 (SP-LOA) aircraft on
crossing runways.**

13 August 2007, Warsaw — Okęcie Aerodrome (EPWA).

The report is a document presenting the position of the State Commission on Aircraft Accidents Investigation on the circumstances of an aviation occurrence, its causes and preventive recommendations.

The report is the result of a preventive examination based on the provisions of international and domestic laws in force. The investigation has been conducted without the necessity to implement legal procedures for presenting evidence.

The statements in this Report, pursuant to Article 134 of the Polish Aviation Act (Dz. U. of 2006, No. 100, item 696 as amended) may not be treated as pointing to the guilty or the responsible for the occurrence.

The commission shall not decide on matters of guilt or responsibility.

Therefore, all forms of using this report for purposes other than preventing accidents and serious aviation incidents may lead to false conclusions and interpretations.

The report has been written in Polish language. Versions in other languages may be prepared only for informative purposes.

Warsaw, 2008

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GENERAL INFORMATION

Type of aircraft No. 1:	Plane Boeing 737-700
Aircraft registration :	OM-NGF
Commander of the aircraft:	Airline Transport Pilot
Flight operator:	Sky Europe, a.s.
Aircraft operator:	Sky Europe, a.s.
Aircraft owner:	Celestial Aviation Trading 65 Limited
Type of aircraft No. 2:	Plane Boeing 767 – 200ER
Aircraft registration:	SP-LOA
Commander of the aircraft:	Airline Transport Pilot
Flight operator:	“LOT” Polish Airlines
Aircraft operator:	“LOT” Polish Airlines
Aircraft owner:	ACG Acquisition
Location of incident:	Warsaw — Okęcie Aerodrome (EWPA)
Date and time of the incident:	13 August 2007, at 16:11 UTC
Nature of damage to aircrafts:	No damage
Injuries:	No injuries

SUMMARY

Note: Time in the report is expressed in UTC (local time (LMT) = UTC +2 hours);

On 13 August 2007, the crew of Boeing 767-200ER aircraft with registration marks SP-LOA (call sign LOT15) was granted clearance for takeoff from runway (RWY) 33 of the Warsaw – Okęcie aerodrome (EPWA) to fly to Newark Liberty International Airport (KEWR). At the same time, Boeing 737 – 700 aircraft (call sign Relax 8 HS) with registration marks OM-NGF, which was waiting for takeoff on RWY 29 to fly to Paris – Orly aerodrome (LFPO), began take-off without permission of the air traffic controller. The controller of the aerodrome’s air traffic control unit (controller), after having noticed that the Boeing 737 was also beginning his takeoff run, ordered its crew twice to reject take off. The crew of the Boeing 767 aircraft, after having noticed the Boeing 737 commencing its takeoff run from RWY 29, rejected take-off of the aircraft. Both aircraft stopped before the RWY 29/33 crossing.

The incident investigation was carried out by SCAAI investigation team composed of:

Bogdan Fydrych MSc. Eng.– team manager – SCAAI Member

Tomasz Smolicz Dr Eng.– team member – SCAAI expert

On the basis of radio correspondence analysis, radar data records of aircraft position, testimonies of the participants of the incident and collected documents, the SCAAI investigation team determined the following reasons of the serious aviation incident:

1. Lack of „situational awareness” of the Boeing 737 crew of the existing air traffic situation on the aerodrome’s runways.
2. Improper monitoring of radio correspondence by the crew of Boeing 737, as a result of the controller’s clearance for takeoff directed to the crew of another aircraft waiting on another runway was falsely accepted.

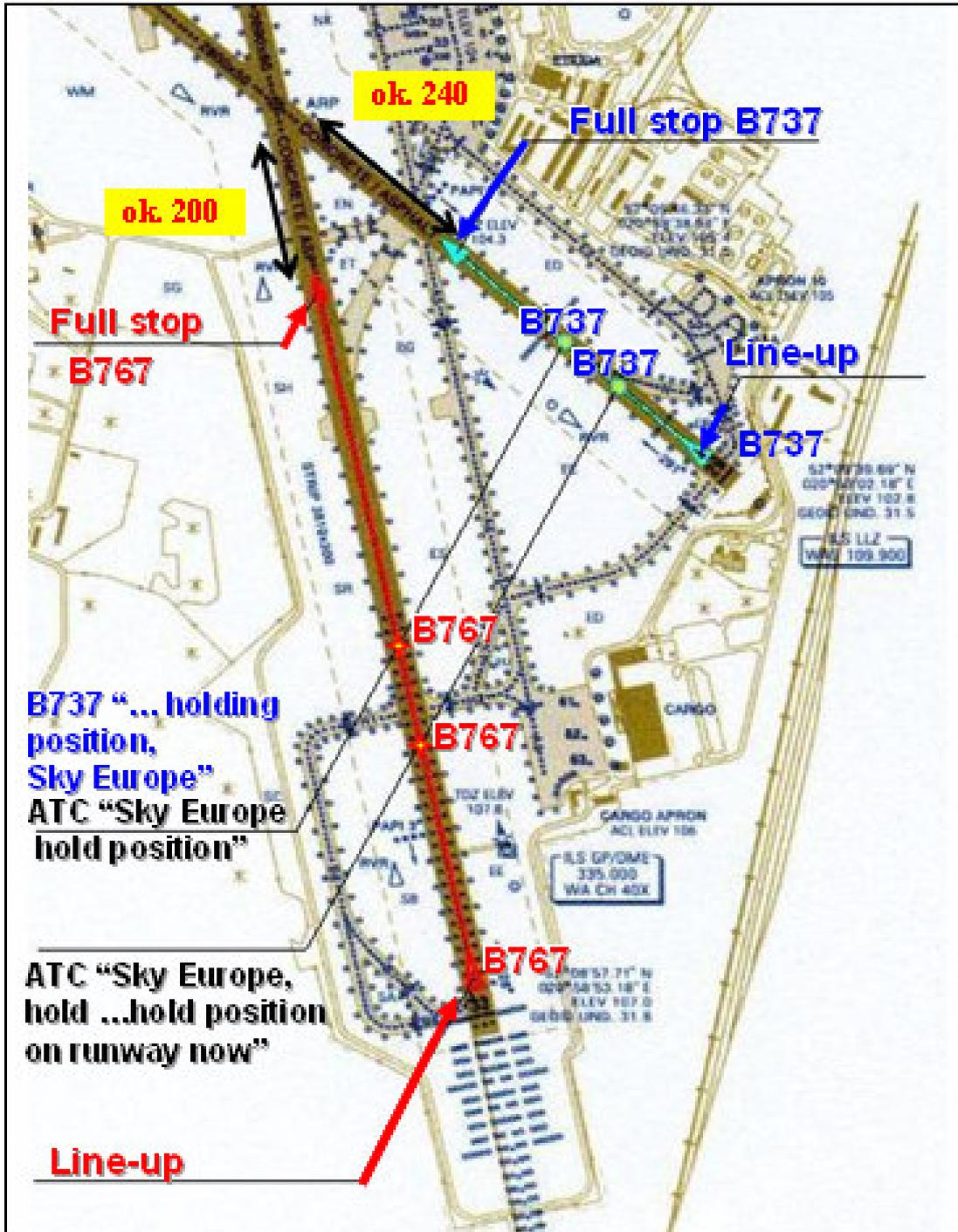
Upon completion of the investigation SCAAI suggested five safety recommendations.

1. FACTUAL INFORMATION

1.1. History of the flight.

On 13 August 2007, departures of aircrafts Boeing 767-200ER with registration marks SP-LOA (call sign LOT15), flying to KEWR aerodrome and Boeing 737 with registration marks OM-NGF (call sign Relax 8HS) flying to LFPO aerodrome were planned from EPWA aerodrome. At 16:07:31, the crew of the Boeing 737 was granted clearance to line-up at RWY 29 and was given an order to wait. The record of the correspondence: „**Relax 8HS, line up and wait runway 29**”, which was confirmed by: „**Line up and wait runway 29, Relax 8 HS**”. At 16:07:53, the crew of Boeing 767 was given clearance from the controller to line up at RWY 33 after the landing of an Embraer 170 aircraft. At 16:09:46, upon arrival on RWY 33, the crew of Boeing 767 received information on wind direction and speed as well as clearance for takeoff. During the call-back repetition of the clearance for takeoff by the crew

of Boeing 767, another transmission was overlapped. Both aircraft began takeoff run almost simultaneously. When the Boeing 737 was passing the “N” taxiing path, i.e. about 12 seconds after beginning the take-off run, the controller twice definitely ordered the Boeing 737 crew to reject takeoff. The aircraft was stopped about 240 meters from the runway crossing. The crew of Boeing 767 rejected take-off on its own initiative and began abrupt hard braking, stopping the plane about 200 meters from the runway crossing. As a result of the braking, an overheat of the breaks of Boeing 767 aircraft occurred the crew had to taxi to an apron in order to cool and examine them. After a one hour stopover, Boeing 767 flew to the destination aerodrome. Boeing 737 aircraft, after stopping and returning to the beginning of RWY 29, took off to fly to the destination aerodrome.



1.2. Injuries

None.

1.3. Damage to aircrafts:

None.

1.4. Other damage.

None.

1.5. Personnel information

The crew of Boeing 737 – 700 aircraft – registration marks: OM-NGF

1.5.1. Captain of aircraft:

- Male, 29 years old
- Total flight time all types: 3647 hours;
- Flight time on B737: 1209 hours;
- Flight time during last 24 hours: 4 hours 7 minutes
- Flight time during last 28 days: 80 hours 12 minutes;
- Medical certification valid until: 31.08.2008.

1.5.2. First officer:

- Male, 30 years old
- Total flight time all types: 2977 hours;
- Flight time on B737: 2729 hours;
- Flight time during last 24 hours: 3 hours 30 minutes
- Flight time during last 28 days: 64 hours 40 minutes;
- Medical certification valid until: 23.10.2007.

The crew of Boeing 767 – 200ER aircraft – registration marks: SP-LOA

1.5.3. Captain of aircraft:

- Male, 54 years old;
- Total flight time all types: 11516 hours;
- Total flights as instructor: 7707 hours;
- Medical certification valid until: 11.01.2008.

1.5.4. First officer:

- Male, 62 years old;
- Total flight time all types: 17950 hours;
- Flight time on B 767: 6400 hours;

- Medical certification valid until: 28.11.2007.

1.5.5. Air traffic controller TWR EPWA.

- Male, 51 years old;
- 03.02.1993 obtained a licence of air traffic controller with qualifications for WARSZAWA aerodrome and approach control.
- Medical certification valid until 01.01.2008.
- 27-31.01.2003: extraordinary and dangerous situations training.
- 21-25.02.2005: extraordinary and dangerous situations training.
- 24.08.2005 professional test on ADI, APP, OJT qualifications with a result: “passed”.
- 20.01.2009: expiring date of operational qualifications ADI, APP Warszawa.

1.6. Aircraft information .

Type of aircraft: Boeing 737 – 700;

- Factory number: 32680;
- Registration marks: OM-NGF
- MTOW: 62998 kg;
- Production year: 2006

Type of aircraft: Boeing 767-200ER

- Factory number: 24733;
- Registration marks: SP-LOA;
- Production year: 1989;
- MTOW: 175540 kg;

1.7. Meteorological information.

- Wind speed: 3.6 m/s;
- Wind direction: 290 degrees;
- Visibility: 10 km;
- Air temperature: 22 degrees Celsius;
- Dew point temperature: 19 degrees Celsius;
- Air Pressure: 1008 hPa.

1.8. Aids to navigation.

No reservations were made concerning the functioning of navigation aids.

1.9. Communications

No reservations were made concerning the functioning of means of communication,

1.10. Aerodrome information

WARSAW/Okęcie aerodrome (EPWA) has two crossing runways, marked 15/33 and 11/29. On the day of the occurrence, RWY 29 was used mainly for departing aircrafts, and RWY 33 for arriving aircrafts. At the EPWA aerodrome, at the request of the crews of “LOT” Polish Airlines Boeing 767 fleet, take-offs for transatlantic flights are performed from RWY 33.

GEOGRAPHIC DATA

1. ARP – WGS-84 coordinates and localisation: 52°09.56.70 N; 020°58.01.64 E – crossing of the axis of runways.
2. Distance from the city, direction: 10 km (5.4 NM), BRG 205° GEO.
3. Elevation of the aerodrome/Temperature of reference: 110.3 m; 27°C (JUL).
4. Dimensions of RWY 15/33: 3690 x 60 meters.
5. Dimensions of RWY 11/29: 2880 x 50 meters.
6. Strength (PCN) and surface of RWY: 57/R/B/W/T asphalt concrete
7. Strength (PCN) stopway RWY 29: 57/R/B/W/T asphalt

1.11. Flight recorders

Boeing 767-200ER

Only the flight parameters from the FDS 8 recorder of Boeing 767 aircraft were analysed. The SCAA I was informed about the occurrence by fax by the airport duty manager on 13.08.2007 at 17:25, which means that actually the Commission found out about the occurrence the next day, i.e. 14.08.2007, when the SCAA I personnel came to work, i.e. at 06:15. The SCAA I could not secure the cockpit voice recorder (CVR) of the Boeing 737 immediately after the occurrence, because the aircraft took off for its destination aerodrome. The audio recording of the occurrence was “overwritten” by a new soundtrack. As a result of the above, the Commission could not determine on the basis of the CVR recording in what way was the permission to start confirmed and how the cooperation of the crew prior to the take-off (CRM) was conducted.

1.12. Wreckage and impact information

Not applicable.

1.13. Medical and pathological information

Not applicable.

1.14. Fire

Not relevant.

1.15. Survival aspects

Not applicable.

1.16. Test and research

SCAAI investigation team analysed the radio correspondence between the crews and the EPWA aerodrome controller, the record of the aerodrome radar data showing the position of aircraft during take-off procedure, testimonies of the controller and aircrafts' crews as well as collected documents.

1.17. Organisation and management information.

SCAAI was informed about the incident by the EPWA airport duty manager on 13.08.2007 and electronically by the ATM Inspection Department of the Air Traffic Agency. On 16.08.2007. SCAAI notified the Slovak Commission, the International Civil Aviation Organisation (ICAO) and interested parties about the occurrence, in compliance with the recommendations of Annex 13 – Aircraft Accident and Incident Investigation. Proper actions of the Runway Safety Team of the Warsaw Frederic Chopin Airport have to be underlined. The following day, the unit carried out an analysis of the incident in order to design preventive actions.

1.18. Additional information.

SCAAI acquainted the Polish Airlines “LOT”, air traffic controller (ATCO) and operator “Sky Europe” with the draft of Final Report.

1.19. Useful or effective investigation techniques.

Not applied.

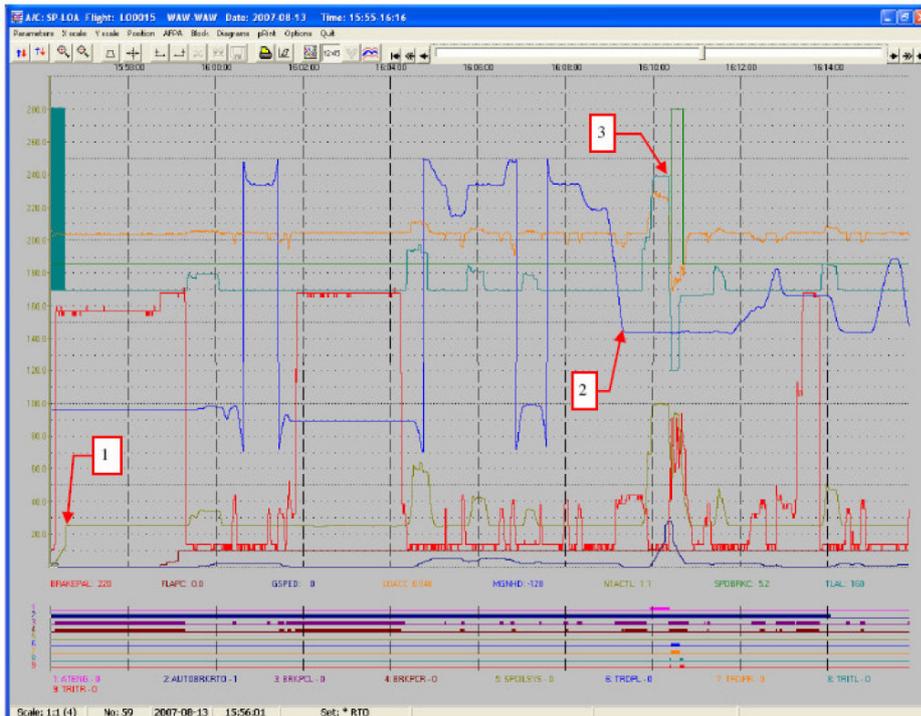
2. ANALYSIS

2.1. Occurrence analysis

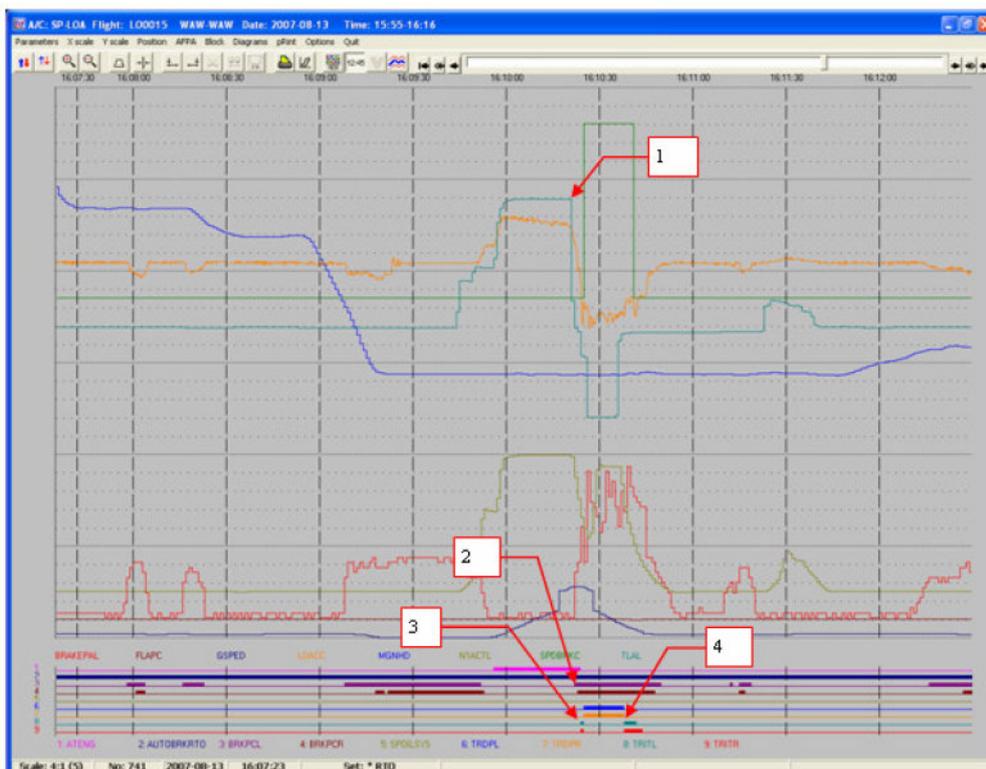
When on taxiway (TWY) “E2,” the crew of Boeing 737 (“Relax 8HS”) received ATCO’s clearance to line-up runway (RWY) 29 and an order to wait, which was confirmed. When on taxiway (TWY) “B6,” the crew of Boeing 767 (“LOT15”) received ATCO’s clearance to line-up runway (RWY) 33 after Embraer 170 landing. Both of them lined-up simultaneously to runways: Boeing 737 after 1 minute and 39 seconds, while Boeing 767 after 1 minute and 16 seconds since the clearances to line-up the runways was cleared. After lined-up on runway 33, the crew of Boeing 767 received information on wind direction and speed as well as clearance for takeoff. The read back of clearance the crew of Boeing 767 for takeoff from runway 33 was interrupted: “*LOT15 ...cleared for take off runway 33 goodbye.*” It was probable that the read back the crew of Boeing 737 the clearance for takeoff transmitted at the same time,

which interrupted the transmission from the crew of Boeing 767. The controller heard only the repeated confirmation from the crew of Boeing 767. Despite the interruption in correspondence, it was important that the call sign of the addressee of the clearance “**LOT 15**” was audible as well as the runway number “... **runway 33**...” At the same time, also the crew of Boeing 737 was waiting for takeoff clearance on runway 29. It is probable that the crew of Boeing 737 thought they would be granted takeoff clearance the first because they were cleared to line-up the runway before Boeing 767. The Boeing 737 (medium) held lower wake turbulence category than Boeing 767 (heavy) and its take-off would not necessitate the 2 minute separation which would have to be applicable if Boeing 767 (heavy) would takeoff first. The above situation represents the so-called „tendency for the expected” which simply means that frequently we hear, or we think we have heard, exactly what we expected. This may happen to the controller, pilot, driver or anyone conducting radio correspondence. Expecting the permission for takeoff, the crew of Boeing 737 aircraft begun the takeoff accepting the clearance granted to the crew of Boeing 767 as the two essential elements, call signs the addressee and the runway number, were completely different. The recording of radio correspondence between the controller and the crews of the aircraft held by the Commission features only an interrupted confirmation of clearance for takeoff for the Boeing 767 crew. Considering the difference between the call signs of both aircrafts: “**LOT one five**” of Boeing 767 and “**Relax eight Hotel Sierra**” of Boeing 737, as well as their respective numbers: **DS 29 (two nine)** and **33 (three three)**, the investigation team assumed that the crew of Boeing 737 heard only a part of radio correspondence which included the very clearance permission for take-off without the call sign and the runway number. The crew of Boeing 737 accepted the clearance as it was granted to them. The controller heard only the call back of the clearance for take-off from the crew of Boeing 767 from RWY 33 together with the simultaneous transmission of an unknown radio station. The Captain of the ATR waiting before the RWY 29 stated that he has not heard any radio correspondence confirming the take off by the crew of Boeing 737. Both crews begun the takeoff run almost simultaneously, within 2 seconds. At that time, the controller conducted visual observation of Boeing 767 beginning takeoff run from RWY 33 and carried on by the phone in order to coordinate the takeoff of the helicopter. When Boeing 737 passed TWY “N,” i.e. ca. 8 seconds since it started its takeoff run, the Controller received information from the assistant which **he failed to hear: “Boeing is rolling on runway, Sky Europe.”** About 16 seconds since Boeing 737 started to move, when the silhouette of Boeing 767 started to overlap with Boeing 737 taking off on RWY 29, the controller ordered the crew of Boeing 737 to reject takeoff twice. The crew of Boeing 737 stopped the aircraft ca. 250 m from the intersection of runways. The crew of Boeing 767 on hearing the correspondence, according to the Captain’s statement: “**Then I heard correspondence in Polish on TWR frequency, said in another voice than that which granted us permission for takeoff, saying something like: “The Big Boeing is also taking off,”**” (lack of record of such correspondence – the Commission obtained a confirmation of providing such information on TWR frequency by the crew of ATR aircraft waiting before the RWY 29.) On receiving the information the Captain looked to his right and saw Boeing 737 which also commenced its takeoff from RWY 29. After checking the speed the crew decided to reject takeoff. According to the read-out the Flight Data Recorder (FDR), the throttles were retracted at the speed of GS = 139 kts, i.e. below the decision speed called V₁ which was 150 kts for that flight. Two seconds later the Captain (the Pilot Flying – PF) pressed the brakes and further two seconds later the thrust reversal was turned on (at GS = 137 kts) which was switched off at GS = 33 kts. The aircraft came to a complete stopped at ca. 200 m from the intersection of runways. The actions taken by the crew of Boeing 767 which led to rejecting the takeoff were fully justified and correct. The fast decision of the crew and applying

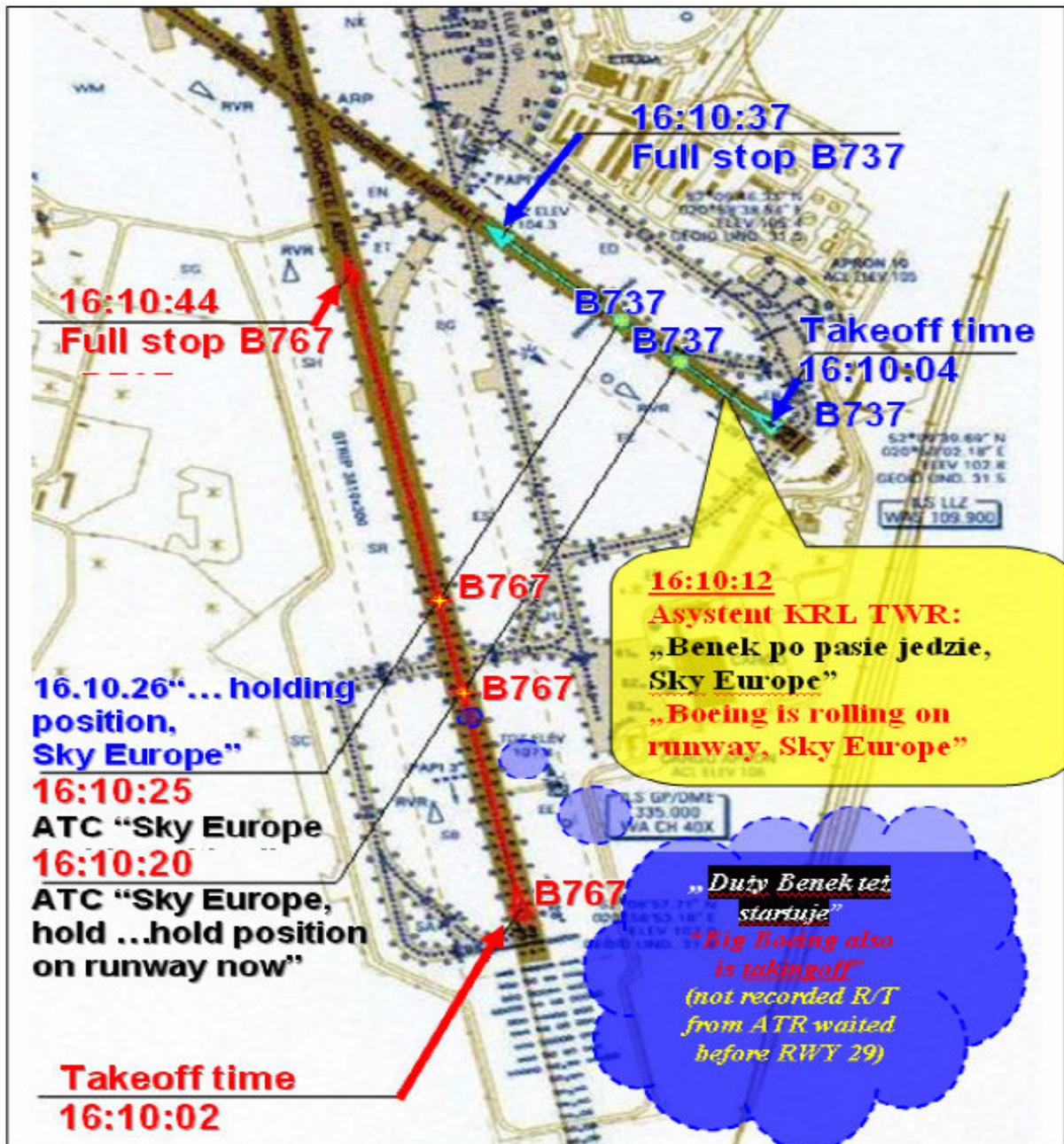
appropriate procedures for takeoff rejection, particularly as the speed was close to V_1 , allowed to stop the aircraft still before the intersection of runways.



1. Start of Engines.
2. Entry into runway.
3. Retraction of throttles and takeoff rejection.



1. Retraction of throttles.
2. Brake usage on the Captain's side.
3. Thrust reversal on.
4. Thrust reversal off.



Fragment of an aerodrome diagram featuring the description of the occurrence.

Not scaled.

During the occurrence under analysis, inappropriate monitoring of radio correspondence and of the air traffic situation, as well as erroneous interpretation of ATS clearance led to a situation where the crew of Boeing 737 were convinced they received clearance for the takeoff which they commenced. The accident was prevented thanks to the visual observation of Boeing 767 taking off by the controller and his decisive actions as well as the actions of

aircraft crews. Good meteorological conditions in the area of the aerodrome on the day of the incident were of major influence on the course of the occurrence (the visibility was 10 kilometres). The basic element of this occurrence was knowledge of present the air traffic situation (“situation awareness”) which should be the basis of the crew’s plan of actions. Inappropriate understanding of the situation in a complex environment of the manoeuvring area of the aerodrome where the crew makes decisions on performing aviation operations most frequently leads to occurrences of diverse consequences. In the occurrence under analysis, the crew of Boeing 737 first assumed the clearance for takeoff as directed at them. Next, after takeoff rejection, the crew of Boeing 737 again assumed the taxi instructions for the crew of Boeing 767 as directed at them. This suggests that the crew of Boeing 737 did not monitor radio correspondence at that time either. The entry in the Air Safety Report filled in by the crew of Boeing 737 also confirms lack of runway air traffic situation in which the crew stated: ***“We immediately advised the tower that I read-back clearance on runway 29. He (the controller – annotation of the Commission) answered that he delivered a landing clearance for LOT aircraft on runway 33.”*** In reality, there is no record of such radio correspondence between the crew of Boeing 737 and the controller. On the basis of a written statement of the crew of Boeing 737 in the ASR and accepting the above interpretation of the crew of the air traffic situation on runways at that time, the Commission assumed that starting takeoff when the LOT aircraft was landing run (according to the crew of B737) and had not left the intersection RWY 29/33 yet could also lead to a crash. As it was already mentioned, the landing plane was a FinnAir Airlines Embraer and Boeing 767 received clearance to line-up RWY 33 after the Embraer landing. It is most probable that the crew of Boeing 737 already misinterpreted radio correspondence between the crew of Boeing 767 and the controller at that stage. Despite widely popularised measures aimed at preventing disturbances in air traffic on the manoeuvring area of the aerodrome, occurrences are quite frequent. The serious incident analysed by the Commission reminded us again that there is still serious threat of tragic accidents similar to those in Tenerife (583 fatalities) or at the Milan aerodrome (118 fatalities). Luckily, meteorological conditions on that day (visibility of 10 kilometres) enabled the controller to see both aircraft and thus prevent the tragedy. Appropriate cooperation of the crew is the basis of correct activities in the cockpit. Clear communication between aircraft crews and the personnel of air traffic control is of particular importance. In this environment, each person is an element of a crew or a team. Each person should be aware of the tasks and responsibilities of others, and be able to help his/her colleagues within the limits of his/her own skills and expertise, if necessary. The use of appropriate radiotelephony phraseology is conducive to efficient and unambiguous communication of information. Each read-back clearances needs to include the acknowledge that the information have been understood. The clearances must be read-back complete and clearly in order to close the “communication loop”. Always shall be read back the call sign. This is the only manner to ensure that all clearances and instructions have been understood correctly. Its is necessary in case of all voice transmissions. Read back of clearances have been introduced to enhance flight safety. Strict observance of rules correct radiotelephony phraseology by way of read back of clearances is directly connected with serious consequences of possible misunderstanding of the communication and receipt of clearances and instructions of Air Traffic Control. Strict observance of rules correct radiotelephony phraseology ensures that clearances or instructions were received and correctly understood by the appropriate aircraft. In case of clearances and instructions: hold short of, cross taxi, takeoff on or land on any runway the items must always be read back with the runway number and read back the whole of the clearances. It is essential to always **ASK** in case of doubts!!!

The all flight crew members are under the obligation to monitor clearances for taxi, takeoff on and land on; they should demonstrate situation awareness throughout their operations on the runway.

The following principles need to be observed in order to prevent runway incursion:

1. Strictly observance of all Standard Operating Procedures and ICAO radiotelephony phraseology.
2. Act in accordance with the clearances or instructions one has actually received, not the ones he/she expected to receive;
3. Plan all ground operations well in order to limit the task burden during the performance of all flight operations.
4. Good situation awareness is of utmost importance during flight operations of all crew members.
5. “Crew Resource Management” (CRM) should remain in force throughout all stages of a flight.

2.5. Evacuation

Not applicable.

3. CONCLUSIONS

3.1. The Commission’s findings

1. The controller held all the necessary qualifications and authorisations to perform flight operations.
2. The controller failed to participate in a professional training (renewal) for TWR controllers covering the principles of conduct in difficult and dangerous situations within the deadline stipulated by PANSAs rules. The above training should be carried out at least once in two years. The TWR controller participated in a training of this kind on 21-25.02.2005.
3. The pilots held all the necessary qualifications and authorisations to perform flight operations.
4. The crews of Boeing 767, Boeing 737 and the controller maintained two-way radio contact within the same radio frequency.
5. The aircraft held valid airworthiness certificates.
6. The devices used to ensure air traffic during the occurrence were on and fully functional.
7. The crew of Boeing 737 did not have situation awareness on the runways.
8. The crew of Boeing 737 failed to monitor radio correspondence in an appropriate way.
9. It is probable that the cooperation of the crew of Boeing 737 in the cockpit (CRM) was inappropriate, which resulted in erroneous acceptance of a takeoff clearance by one of the pilots and acceptance of the error by the other pilot.
10. The Commission was unable to establish the way of read back the takeoff clearance nor the way the cooperation between crew members before the take off was conducted (CRM) due to lack of record of conversations in the cockpit (CVR).

3.2 The cause of the serious incident.

1. Lack of “situation awareness” of the Boeing 737 crew of the existing air traffic situation on the aerodrome’s runways.
2. Improper monitoring of radio correspondence by the crew of Boeing 737, as a result of the controller’s clearance for takeoff directed to the crew of another aircraft waiting on another runway was falsely accepted.

4. SAFETY RECOMMENDATIONS.

1. The Commission accepts the entry included in Standard Operating Procedures TWR EPWA which forbids lining-up for departure planes to use more than one runway at a time.
2. Aerodrome management, Polish Air Navigation Services Agency, aviation operators – devise and implement procedures of immediate notification of SCAAI by phone (**emergency 24h hotline: +48 500 233 233**) of aviation occurrences where it is essential to immediately secure records of data.
3. Aviation authorities of the Slovak Republic, Air Airlines “Sky Europe” – verify the process of training in respect of crew cooperation (CRM).
4. Polish Air Navigation Services Agency – materials devoted to this occurrence should be used during specialist trainings.
5. SCAAI – consider introducing 24h duties in the seat of the Commission in order to be able to take measures connected with:
 - Immediate notification of foreign countries of aviation occurrences;
 - Taking steps aimed at immediate securing records of data;
 - Preparing equipment and documentation for the investigation group sent to the site of the occurrence.

THE END

SCAAI investigation team leader

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