Smolensk Crash
Four Years Later

Kazimierz Nowaczyk, Ph.D.
Presentation Summary

- Severny Airport
  - Air Navigation
  - Rescue Operation
  - Russian Investigation
- Russian and Polish Final Reports
  - Black Boxes Data
  - Birch Tree
  - TAWS #38
  - Main Crash Site
- Conclusions
Air Navigation

<table>
<thead>
<tr>
<th>Time</th>
<th>Entity</th>
<th>Conversation</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:23:00</td>
<td>RP</td>
<td>Hallo, Good Day, I bother from &quot;Severny&quot;. Under whose control is the Polish side, now.</td>
</tr>
<tr>
<td>10:23:08</td>
<td>Yuzhnyi</td>
<td>Moscow directs.</td>
</tr>
<tr>
<td>10:23:09</td>
<td>RP</td>
<td>What?</td>
</tr>
<tr>
<td>10:23:10</td>
<td>Yuzhnyi</td>
<td>Moscow directs.</td>
</tr>
</tbody>
</table>

Conversation between Air Traffic Controllers on Severny and Yuzhny airports in Smolensk. Phone calls transcript from Severny

<table>
<thead>
<tr>
<th>Time</th>
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</tr>
</thead>
<tbody>
<tr>
<td>10:25:59</td>
<td>Krasn.</td>
<td>Krasnokutski, you know, makes the controlled approach, commander's decision. He prepares controlled approach until they reach the 100 m (300 ft.) altitude, later ask Minsk, Vitebsk if are ready as the spare.</td>
</tr>
<tr>
<td>10:26:11</td>
<td>Disp.</td>
<td>Received.</td>
</tr>
<tr>
<td>10:26:13</td>
<td>Kras.</td>
<td>Have you received? (Understood?)</td>
</tr>
<tr>
<td>10:26:14</td>
<td>Disp.</td>
<td>Yes, sir!</td>
</tr>
</tbody>
</table>

Conversation between colonel Krasnokutski and Air Traffic Controller. Transcript from microphones installed on Severny Airport Traffic Tower

<table>
<thead>
<tr>
<th>Time</th>
<th>Entity</th>
<th>Conversation</th>
</tr>
</thead>
<tbody>
<tr>
<td>10:40:14</td>
<td>RZP</td>
<td>4, on the course, glide path.</td>
</tr>
<tr>
<td>10:40:17</td>
<td>101</td>
<td>On the course, glide path.</td>
</tr>
<tr>
<td>10:40:27</td>
<td>RZP</td>
<td>3, on the course, glide path.</td>
</tr>
<tr>
<td>10:40:31</td>
<td>RP</td>
<td>Turn on head lights</td>
</tr>
<tr>
<td>10:40:33</td>
<td>101</td>
<td>Turned on.</td>
</tr>
<tr>
<td>10:40:39</td>
<td>RZP</td>
<td>2, on the course, glide path.</td>
</tr>
</tbody>
</table>

Transcript from communication between Air Traffic Controller and Polish first pilot

RP, Disp.: R. Plusnin, Air Traffic Controller  
RZP: V. Ryzenko, Air Traffic Controller  
Yuzhny: Airport south from Smolensk  
101: Polish Air Force One
Polish Air Force One spent most of its descent outside of the radar margin error for the glide path. Figure shows airplane trajectory compare to the runway center line on satellite photo from 04.11.2010. Power blackout at altitude 15 m, 70 m in front of the first traces on the ground.
Ten minutes after the crash the airport rescue units were called so the first fire engines arrived on the crash scene fourteen minutes after the crash. First medical unit arrived seventeen minutes after the crash. Within minutes of the crash the Russians in charge of rescue and recovery operation announced that nobody survived. This information was immediately forwarded to Poland even though the body of the President of Poland was found four hours later.
Satellite photos from 11 and 12 April demonstrate left stabilizer position changes (red boxes). In Russian MAK report marked position from April 12 (yellow point 33 in red box).
Video footage of the Russian workers destroying the wreckage, in particular breaking the windows and bulldozering the crash site, was shown in a documentary “Misja specjalna” by A. Gargas. Before all body parts of the victims were recovered and fragments of the airplane were collected, a concrete pavement was poured over some parts of the crash site and a concrete road was constructed over it on April 11, 2010.
Largest airplane parts were moved to the concrete pavement of the airport and were left there without any protection from sunlight or onlookers for many months. Several tons of small parts were piled up like trash without any order or protection in the nearby barn. After many requests of the Polish side, the large parts of the wreckage eventually were fenced off and covered by tarp. Later, a plywood structure was constructed over the wreckage of the airplane. There was no attempt to reconstruct the airplane.
Electronics & Sensitive NATO instruments and documents recovered by the Russians:

- Satellite telephone
- Cell phone of the President of Poland
- Cell phone of Air Force Commander General Andrzej Blasik
- Cell phone of Army Commander General Bronislaw Kwiatkowski
- Cell phone of the Secret Service Ministry coordinator Zbigniew Wassermann
- Three Motorola Radio telephones
- Ten Black Berry smart phones
- 60 cell phones
- Twenty photograph cameras with memory cards
- Video camera with memory card and tape
- Industrial camera and two computers
- Documentation including top secret NATO documents.

Special military unit Spetsnaz was present on the crash site from the beginning.
“Accidents happen. But Russia’s actions immediately after the crash - unusually swift and unprecedented - reflected actions akin to a criminal cleaning up the crime scene, not a concerned nation seeking answers”

Conclusions

• Descent without visual contact with ground references to an altitude much lower than minimum descent altitude for go around (100 m) in order to establish visual flight.

• The presence of the Commander-in-Chief of the Polish Air Forces in the cockpit until the collision.

• Psychological pressure on the pilots to continue descent in the conditions of unjustified risk with a dominating aim of landing at any means.

• Controlled flight into terrain (CIFT), collision with birch tree, aircraft roll left. In results total destruction and death of the crew and passengers.
### Recorder symbol:

<table>
<thead>
<tr>
<th>Recorder symbol:</th>
<th>Recorder type and function:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. KBN-1-1</td>
<td>Digital exploitation data recorder made in Russia and installed near the cockpit.</td>
</tr>
<tr>
<td>1. MARS-BM</td>
<td>Digital sound data recorder, installed in the tail of the airplane near MLP-14-5. (It was found near the marks of the first contact with ground).</td>
</tr>
<tr>
<td>1. MLP-14-5</td>
<td>Digital catastrophic data recorder installed in the tail of the airplane (exposed to high temperature). It was found near the marks of the first contact with ground.</td>
</tr>
<tr>
<td>ATM QAR</td>
<td>Quick access digital data recorder collecting the same data as KBN-1-1. ATM-QAR was made in Poland</td>
</tr>
<tr>
<td>K3-63</td>
<td>Analog data recorded (not found)</td>
</tr>
</tbody>
</table>

### Data file name:

<table>
<thead>
<tr>
<th>Data file name:</th>
<th>Recording time and additional information:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Msrp64.dta</td>
<td>Obtained on April 20, 2010 from a compressed file Spl101.c00, which was a copy of tape ATM-MEM15 number 158/91 created on April 17 2010 in Warsaw.</td>
</tr>
<tr>
<td>MLP-14-5A.dat</td>
<td>Copies from data recorder MSRP-64 – MLP-14-5, created on May 31, 2010 in Moscow in presence of representatives of Polish Office of Prosecutor, Office of Prosecutor of the Russian Federation, Polish Investigating Commission and IAC.</td>
</tr>
<tr>
<td>MLP-14-5B.dat</td>
<td></td>
</tr>
<tr>
<td>KBN.DAT</td>
<td>A copy from the data recorder MSRP-64 – KBN-1-1, created on May 31, 2010 in Moscow in presence of representatives of Polish Office of Prosecutor, Office of Prosecutor of the Russian Federation, Polish Investigating Commission and IAC.</td>
</tr>
<tr>
<td>85837.FDR.ALLData.dat</td>
<td>A copy from data recorder FDR (MLP-14-5), created in Moscow without any witnesses delivered to Polish Investigating Commission by investigators of the Office of Russian Federation. Last two seconds were taken into the report data charts.</td>
</tr>
</tbody>
</table>
The Russian Report is based exclusively on the data obtained from the exploitation data recorder KBN-1-1 made in Russia. A Polish copy of this recording ends several second short of 41-st minute, thus becomes useless in the analysis of the last phase of the flight. The most important last half second of the data obtained from a quick access digital data recorder ATM-QAR made in Poland was deleted and replaced with additional 2 seconds of poor quality data from the catastrophic data recorder MŁP-14-5.

Universal Avionics (NTSB report):
- TAWS - Terrain awareness and warning system
- FMS – Flight Management System
Scaled satellite photo after orthorectification, prepared by K. Nowaczyk
04.11.2010 sector number 13: deformed aircraft fuselage debris in front of the first traces on the ground. Approximate area 60x120 m.

Aircraft fragments near birch tree and TAWS #38

Russian prosecutors reports from 10 and 11 April 2010, prepared by M. Dąbrowski, from 2011 cooperating with the Polish Parliamentary Committee for the Investigation of the 2010 Smolensk Air Disaster,
Data from Russian black box KBN-1-1 recovered from MAK report. Polish black box QAR stop recording aircraft parameters at 6:40:59 UCT time. According to ATM expertise aircraft altitude over the birch ground was 10.5 m.
The black boxes showing abrupt violent movement of the aircraft seconds before crash.
Wieslaw Binienda Ph.D. Expert on high energy impact virtual experiments, member of the aerospace consortium supporting the investigation of the Space Shuttle Columbia disaster; editor-in-chief of the Journal of Aerospace Engineering of the American Society of Civil Engineers (ASCE); an expert of the Polish Parliamentary Committee for the Investigation of the Crash of the Polish Air Force One, Prof. Binienda serves as the Dean of College of Engineering, The University of Akron, Akron, OH.
Fragments of left wing hanging on birch tree after collision at 270 km/h.
Analysis of encoded data by Universal Avionics, manufacturer of the TAWS, was omitted entirely in the Final Russian Report. This omission included, in particular, the last data sequence (TAWS #38) consisting of last reading of aircraft’s location, altitude, status and other key data. The Final Russian report included data which contradicted that of TAWS #38.
Aircraft trajectory after birch tree and 3D position at TAWS #38, according to Polish and Russian report
A good correlation between the calculated roll angle and the recorded roll angle data from the aircraft’s black box, is only present when assuming a wing loss of about 8.5 m to 10.5 m [instead 6.5 m in MAK report].

Glenn Jorgensen, MSME, Denmark, - former lecturer at the Technical University of Denmark, he is an engineer and a pilot; holds a master’s degree in fluid dynamics and structural analysis, with specialized training in fluid dynamics related to aviation and building of aircrafts; spent 15 years working as a consultant in performing various simulations and analysis, including structural FEM analysis; spent many hours flying as a civilian pilot.
Many trees and shrubs were cut down in the vicinity of the crash site, grass was burnt and top soil was removed, especially near the location TAWS #38.

Excavation pit from which soil was removed to cover an area from which critical data of the aircraft’s TAWS #38.
Power blackout at altitude 15 m, 70 m in front of the first traces on the ground. Aircraft 3D position compared to ground traces on satellite photo from 04.11.2010. (K. Nowaczyk and M. Dąbrowski).
Crash Site

Prof. W. Binienda simulation
Gregory Szuladzinski PhD,- Australia, expert on stress analysis, vibrations and nonlinear dynamics, structural and mechanical shock and impact analysis, computer simulations in the action of explosives, structural dynamics in aerospace structures, 1966 to 1980: In the United States he worked for Northrop Corp. (structural design/analysis of Boeing 747 fuselage) Jet Propulsion Lab, Pasadena (Viking spaceship) Parker Hannifin (helicopter control mechanisms) and others.
A part of the fuselage inverted and opened up
Six months after the crash a team of Polish archeologists was finally allowed to examine the crash site. The Polish experts found ten thousand small fragments on the surface and identified with metal detectors capable of detecting up to 20 cm deep another twenty thousand fragments of metal hidden in the soil up to 20 cm deep. Using several drills they confirmed that near the location of every small metal fragment there were on average another six non-metal fragments. Some metal fragments were exposed to high temperature.
<table>
<thead>
<tr>
<th>AIRCRAFT</th>
<th>EXPLOSION</th>
<th>IMPACT</th>
<th>NUMBER OF DEBRIS</th>
</tr>
</thead>
<tbody>
<tr>
<td>PanAm 103 Lockerbie</td>
<td>Yes (bomb and fuel)</td>
<td>High Energy (altitude 19 000 feet)</td>
<td>Over 11 000 (including fragments of personal property) Reconstructed 95% of airplane</td>
</tr>
<tr>
<td>TWA 800 New York</td>
<td>Yes (fuel)</td>
<td>High Energy (altitude 16 000 feet)</td>
<td>3168 (aircraft fragments) Reconstructed 95% of airplane</td>
</tr>
<tr>
<td>Tu-154M Smolensk</td>
<td>No?</td>
<td>Low Energy (altitude 50 feet)</td>
<td>35 000 recovered by archeologist 60 000 estimated (including aircraft equipment). No attempt to reconstruct</td>
</tr>
</tbody>
</table>

Aircraft catastrophes - number of debris comparison prepared by Piotr Kublicki

Main Crash Site
Conclusions

• Data recorded by FMS and TAWS are the only record of what happened immediately preceding impact with the ground. The other flight recorders stopped working earlier than TAWS and FMS did. Data from polish recorder are inconsistency with presented by Russian report.

• According to this data combined with images of the crash site, the left wing of the aircraft has been disintegrated approximately 50-70 meters before the birch tree..

• The left part of the wing and some parts of its middle section fell on the ground between the birch tree and TAWS #38. This is confirmed by G. Jørgensen’s computations, TAWS Fault Log records, as well as by the ATM report.

• The explosion inside the fuselage described by Dr. Szuladzinski’s Report No. 456 took place after TAWS #38 has been recorded, around one second before first impact with the ground. This is confirmed by recent findings of an investigation of the crash site by a team of Polish archeologists.
Lech Kaczyński stands with Georgian President Mikheil Saakashvili, Ukrainian President Viktor Yushchenko, and the presidents of the three Baltic states in Tbilisi during the 2008 South Ossetia war. (AFP)

We are here to take up the fight. For the first time in years our eastern neighbor shows their true face that we have known for hundreds of years. They think other nations should be subordinated to them. We say no! That country is Russia; the era of the empire was coming back.

We know well that today Georgia, Ukraine tomorrow, the day after the Baltic States, then perhaps the time for my country, for Poland!

Lech Kaczyński
Tbilisi, Georgia, August 12, 2008