

Urban legends for the European Parliament?

In March 2015 the Polish “Parliamentary Committee for Investigation of the Tu-154M Crash” presented a paper on the causes of the 2010 crash of the Polish presidential aircraft in Smolensk to the members of the European Parliament. It's utterly astonishing that the paper refers to the Russian IAC (MAK) report, disregarding the official report prepared independently by the Polish state commission and published in July 2011.

We will not comment on the statements of the Russian IAC report, as Poland's stance has been already expressed in an official document. However we feel obliged to explain numerous errors, misconceptions, urban legends and lies contained in the mentioned paper.

About the “Parliamentary Committee for Investigation of the Tu-154M Crash”

The “Parliamentary Committee for Investigation of the Tu-154M Crash in Smolensk, Russia on April 10, 2010” (in Polish: “Zespół Parlamentarny Ds. Zbadania Przyczyn Katastrofy TU-154 M z 10 kwietnia 2010 r.”, literally “Parliamentary Team for Investigation of the causes of the Crash of TU-154M on April 10, 2010”), chaired by PiS vice-president Antoni Macierewicz, as of August 2015 consists of 93 MPs. It's noteworthy that all but one member of this team are current or former members of one party – PiS (“Law and Justice”).

About the Polish investigation of the Smolensk Crash

The Smolensk Crash has been investigated by Polish experts since the day of the accident. Members of the Polish state aviation accident investigation commission came to Smolensk on April 10, 2010 and performed examination of crash site and wreckage, documented on over 1500 photographs. The go-team consisted of 18 of 34 members of the state commission investigating the accident. Polish representatives took part in downloading the contents of aircraft's “black boxes” (cockpit voice and flight data recorders). One of data recorders (Polish made ATM QAR) was examined in Poland, western avionics of the Tu-154M (FMS and TAWS computers) were examined at manufacturer's facility in the USA. Findings of the Polish commission, including the cause of the accident, were published in the official report in July 2011. The prosecutor's investigation to determine personal responsibility for the accident is ongoing. So far all findings of prosecutor's experts confirm the findings contained in the state Commission's final report.

Errors, misconceptions, urban legends and lies in the Committee's paper

“[The] aircraft was directed away from correct landing zone”

False. The aircraft was not “directed” anywhere. Subsequent four CVR readouts made independently by Polish forensic laboratories did not reveal any commands issued by the Smolensk controllers that would require the crew to change course nor glide path.

“Locations of major crash debris 'changed' during the night of April 11-12 in order to 'consolidate' the wreckage”

In fact exactly one major part of the wreckage was moved during the rescue operation. The left horizontal stabilizer that separated on collision with trees at Kutuzova street just before the impact with ground was moved some 30 meters, however it remained in the same zone between the street and the point of collision with ground.

“Destruction of wreckage occurred prior to debris transport”

Cutting of large wreckage parts before removal from the crash site is often required and is a normal procedure – ask AAIB, BEA, BFU, NTSB or other aviation accident investigation agency. Wreckage condition has been documented (photographed) prior to removal.



Fig 1: Heavy equipment used to remove aircraft wreckage. Left: Birmingham-Shuttlesworth, Alabama UPS 1354 crash (Source: al.com), Right: San Francisco, California Asiana 214 crash (Source: nycaviation.com)

“Data [from flight recorders] is inconsistent (...) copies provided [by Russians] to the Polish side showed signs of tampering”

Copies of the CVR and FDR were not “provided by Russians to the Polish Government”, but acquired by Polish specialists sent to Russia. Data from one of the recorders – Polish made solid-state ATM QAR – was downloaded in Warsaw, Poland by the manufacturer. Contents of all three recorders have been verified to be consistent except for minor data drop-outs typical to tape recording (Russian FDR and QAR) and clearly proved that all systems of the aircraft were functioning properly up to the moment of collision with the large birch that severed the port wing.

“Analysis of encoded data performed by Universal Avionics, manufacturer of the TAWS (Terrain Awareness Warning System), was omitted entirely in the Final Russian Report. The omission included, in particular, the last data sequence (TAWS #38), consisting of last reading of the aircraft location, altitude, status and other key parameters”

The TAWS memory readout, made by the manufacturer – Universal Avionics Systems Corporation in Redmond, USA – is included in the Polish Government commission report. Irregularities mentioned here, including TAWS event #38 (false "landing" indication due to destruction of a sensor by impact with trees) happened after collision with obstacles that rendered the aircraft uncontrollable.

“According to flight recorder data combined with crash site images, the left wing of the aircraft started to disintegrate 50-70 meters before the birch tree location”

There's no evidence supporting this claim. Collisions with trees before the large birch (at a height of some 4 m from ground!) caused only some minor damage to the airframe. The only evidence of imminent trouble were noises of impacts recorded by CVR and slight increase of engine vibration recorded by ATM QAR, caused by fragments of tree branches ingested by engines – and the dramatic voice of the navigator reading the rapidly decreasing radio altimeter indications: “90, 80, 70, 60, 50, 40, 30, 20!”

“Total destruction of the aircraft was a result of a series of explosions, with the first occurring inside the wing, midair, following the TAWS #38 recording, at roughly few seconds prior to first impact ground impact”

There's no evidence of inflight explosion at all. Airframe fragments found outside areas of post-crash fire were not sooted, no debris exhibit marks typical to explosion, like petalling or pitting. No debris from inside the fuselage were found before ground scars, so the fuselage was destroyed on impact with ground.



Fig 2: An example of concentration of staining and microcraters with some gas wash near the tip of a curl from a petaled hole torn in an aircraft fuselage by explosion. **No such marks have been found in Smolensk.** (Source: *Forensic Investigation of Explosions*, CRC Press, © J. Garstang)

“Stating that all passengers have experienced more than 100g of negative acceleration from a low level crash (normally up to 30g) cannot be correlated with the crash scenario”

The Polish Government report says: “According to the trajectory which the aircraft followed on the surface of the ground, the flightcrew were subject to impact acceleration along the —xll axis (back-to-chest). Assessing the character of injuries of crewmembers’ heads, chests and spines, their bodies were given a surge load not smaller than 100 g.” Moreover, one should bear in mind that the aircraft crashed into the ground upside down with a speed of over 260 km/h.

“Polish military pilots of the Yak-40, which is an hour earlier landed at Severny airport (...) heard for several seconds before the crash interrupted shooting and whistling sounds of engines Tupolev and then after a series of explosions sound declining only one engine (sic!)”

This is not true. Yak-40 commander Artur Wosztyl testified before the Polish prosecutor as follows: “It was a sound of approach at stable engine parameters. Suddenly I heard engines spooling up to takeoff thrust, as if pilot would try to increase RPM to level off or enter a climb. (...) A few seconds later I heard loud cracks, bangs and detonation. Then came an abating noise of an engine and then silence.”

“air photo of the crash scene made on 12/04/2010 with marked only selected fragments of found pieces”

This is a plan showing locations of significant debris published in the Final Report. Full debris lists with thousands of items are never published in final reports due to obvious space limitations.

“journalists published the hidden protocols prosecutors of the Russian Federation dated 10 and 11 April describing the wreckage found at the site when the plane was still in the air. Their quantity and origin not only of the damaged wing, but also of the fuselage”

False. No fuselage parts have been found before ground scars (the point of first impact with the ground).

“Already before April 10 (sic!), both sides of the fuselage were cut off and pulled away. The idea behind that was to destroy the characteristic shape of the fuselage consistent with aftermath of the internal explosion”

This assumption is just silly. Condition of the wreckage was documented on photographs. What's important, the cargo hold ceiling visible in this part of wreckage, which was also the cabin floor, can be seen perfectly flat, what would not be the case after an explosion in the fuselage.



Fig 3: A look inside the cargo hold reveals perfectly flat ceiling (now at bottom) being also the cabin floor, that would be buckled or destroyed in case of explosion in the fuselage.

“The destruction of airplane debris took place immediately on the day of the crash without assuring adequate documentation regarding debris positioning, photographing original debris shapes”

This is not true. Extensive documentation of the debris on the crash site, containing over 1500 photographs, was made by Polish investigators. Actions described in the paper are usual during wreckage removal and were performed a few days after the accident.

“all windows in the fuselage were broken immediately”

It's a lie. Most of window panes can be seen intact on photographs from the storage site on the Smolensk Severny aerodrome. A few were broken to hoist large fuselage parts from the crash site (a rope remaining in a broken window can be seen on photographs from the storage site).



Fig 4: A rope used to hoist large fuselage part can be seen remaining in a broken window on a photograph from the storage site

“large sections of the airplane were cut into smaller parts, cables were cut and pulled out, heavy sections were deformed and damaged further by being dragged by excavator and other heavy machinery”

These are usual actions during wreckage removal – see photos from other accident sites above.

“Crash deformation of aircraft tail has been 'repaired' even before it was moved to its final storage site”

It's an urban legend. Deformed engine #2 exhaust nozzle can be seen on photographs from the storage site on the Smolensk Severny aerodrome.



Fig 5: An urban legend presented to the European Parliament: “deformation of aircraft tail has been 'repaired' even before it was moved to storage site”. Deformed engine #2 exhaust nozzle seen on photos from the crash site (left) and storage site on the Smolensk Severny aerodrome

“[Polish archeologists] found ten thousand small fragments on the surface and identified another twenty thousand of metal hidden in the soil (...) they confirmed, that the location of every small metal fragment was accompanied by another six non-metal fragment (total estimated number 60 000)”

Large number of fragments is not unusual - after the Swissair 111 crash in the Atlantic ocean near Halifax, Canada, some 2 million pieces have been recovered from the ocean floor. There was no explosion, just collision with water. Moreover, most of the items discovered by archeologists in Smolensk were fragments of plastic interior furnishing of the cabin, fragments of pottery and so on.

“Some metal fragments had been exposed to high temperature”

Smolensk Archeologists' report says: "Perhaps they were burned/sooted due to passing through hot turbines". Indeed, marks left by tips of rotating turbine blades can be seen on a photo in the report.



Fig 6: Marks left by tips of rotating turbine blades on a small metal fragment suggest it has been ingested by one of plane's engines – photo from the Archeologists' Report

“...the number of visible debris on map prepared for the Polish Archeologists' report (...) is incomparable (sic! – shouldn't it read 'comparable'?) to famous air catastrophes caused by explosions”

Elongated shape of the debris field is consistent with shallow impact with ground. Besides, the debris field that the paper refers to starts with the first ground impact point.



Fig 7: Elongated shape of the main debris field is consistent with shallow impact with ground. Narrow width contradicts the explosion theory. Point of the first impact is just outside the top-right corner of the picture.

“...fragments detected even farther than the birch tree that supposedly has caused the crash.”

Before hitting the large birch that severed the port wing, the aircraft collided with smaller trees with trunks up to some 10 cm (4 inches) wide, breaking them some 4 m from the ground, which caused only minor damage to the airframe. One (1) small fragment of aircraft skin has been found between small trees and the large birch.

“Four copies of 'the same' CVR [Cockpit Voice Recorder] tape (MARS-BM) were made upon the request of the Polish side. Each copy provided to the Polish side had a different total duration”

In fact the CVR and FDR were taken to Moscow for readout jointly by Russian and Polish specialists. All copies used in Polish investigation were not "provided", but made in Moscow by Polish representatives.

Differences in CVR copy lengths were caused mostly by peculiarities of the autoreverse mechanism during replay.

The integrity of the original tape and recording was positively confirmed by Polish forensic experts from the Institute of Forensic Research in Krakow.

“K3-63 – Armoured electromechanical film-based quick access recorder (not found)”

K3-63 was a primitive mechanism in a bakelite case, recording just three parameters – all of them were recorded by remaining data recorders.

“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 disaster data recorder MLP-14-5”

This is a major misconception. The most important phase of the flight ends with impact with the large birch that severed the left wing and rendered the aircraft uncontrollable. Analysing flight after that point has not much sense from the perspective of accident causes. Nevertheless, Polish experts (including specialists from the ATM QAR manufacturer) confirmed the integrity of appended data.

“Another issue concerns copies of the CVR [Cockpit Voice Recorder] MARS-BM (...) recording changes introduced in the digital (computer) process cannot be excluded”

Polish forensic experts from IES (Institute of Forensic Research in Krakow), using advanced methods such as magnetic domain imaging and electric network interference analysis excluded the possibility of any form of tampering with the CVR recording and the original tape.

“TAWS #38, found 140 meters in a straight line from the birch tree, proves that the aircraft could not have collided with the said tree”

TAWS #38 was recorded exactly on the trajectory of the uncontrolled flight, marked on the ground by broken trees – including the birch.

“Furthermore, according to the FMS data recovered, the moment when the central memory system ceased recording any further data because of power blackout occurred when the aircraft's altitude was 15 metres and its geographical position was about 50 meters from the area of initial impact with the ground”

The FMS data contains last recorded coordinates from three onboard GPS receivers. All of them point exactly to ground scars marking first impact with the ground – and this is where power was lost due to disintegration of the fuselage. Everyone can check it just by entering these coordinates into the Google Earth search field.

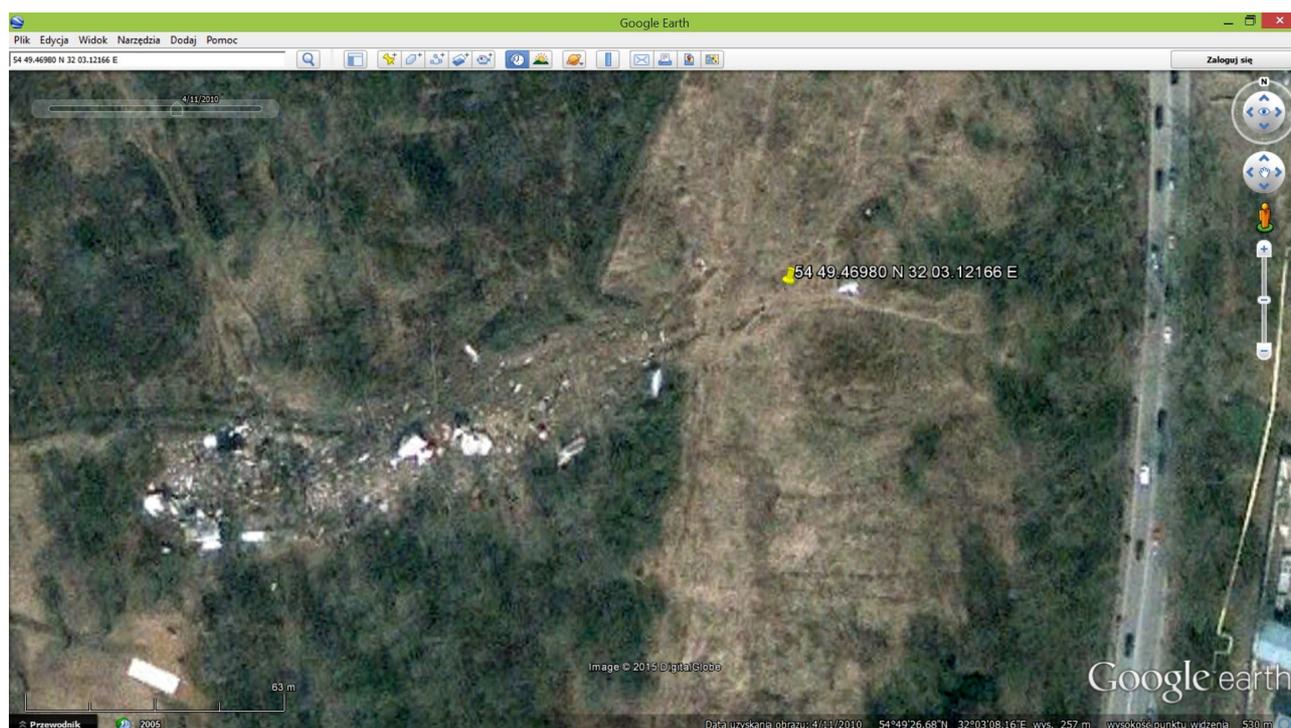


Fig 8: Last GPS coordinates recorded by FMS computer match exactly the point of ground impact

“The Polish commission didn't conduct its own investigation, its representatives didn't participate in the crash site examination, didn't participate in autopsies, and didn't investigate the wreckage nor the black boxes”

This is just a lie. Members of the Polish commission came to the accident site the same day the disaster happened.

They examined the crash site and wreckage, taking over 1500 photographs.

Copies of the voice and data recorders were made in Moscow by Polish specialists, data from one of the recorders (solid state ATM QAR) was downloaded in Poland and used in investigation, Polish specialists assisted with data recover from FMS and TAWS computers in the USA.



Fig 9: Polish civilian and military investigators on the crash site in Smolensk

“The most important piece of information [from ATM QAR flight data recorder] in the form of final half second was digitally deleted from this recording and replaced by two seconds from the MLP-14-5 recorder of very poor quality”

This is not true. Due to process of digital compression, data of last 1,5 s of flight has not been written to ATM QAR memory and was lost. Additionally, the last frame of data (0,5 s) in the memory was incomplete. Therefore for the decoding purposes the last 0,5 s of ATM QAR data was replaced with 2 s of good quality data from MLP-14-5.

The last phase of flight – after collision with the large birch – lasted about 5 seconds, so all the crucial data representing the last phase of the flight leading to the collision with trees and upon the loss of control was present in the ATM QAR recording.

“As seen in the figure, the left wing of the aircraft even after supposedly having lost its left tip would have been two meters underground”

This statement is not based on actual FDR/QAR data. Before collision with the large birch the aircraft was climbing with the vertical speed of 6 m/s, the radio altimeter showed height 6,2 m over ground. 47 meters after the birch the aircraft flew at a height of 7 meters with 16 degrees left bank. About 1,7 seconds after collision with the birch the Tu-154M achieved height of 18 m over the ground with 90 degrees left bank and only then started to descend, flying forward at 260 km/h.

“Reconstructed horizontal trajectory show that the aircraft could not have made the complete roll to the left after impacting the birch tree, because the complete roll would have to result in in the change of its heading prior to TAWS #38”

Parameters registered by flight data recorders and physical evidence from the accident site (broken trees) fully confirm the final trajectory of the aircraft.

“The loss of the first fragment of the left wing should not have caused the roll-over (G. Jorgensen, K. Nowaczyk). A good correlation between the calculated roll angle and the recorded roll angle data from the aircraft's flight data recorder is only present when assuming a wing loss of about 8.5 m to 10.5 m”

Jorgensen's calculations have been proven incorrect by renowned aerodynamicist prof. Grzegorz Kowaleczko, former director of Aviation Technology Institute of Military Technical Academy.

“A birch tree blamed for damaging the wing could not have cut the wing (W. Binienda, G. Szuladziński). FEM parametric calculations show that if the plane had hit the birch tree at the velocity of 75 m/s, the wing would have cut the tree. There would be only minor damage to the wing leading edge”

Mr Binienda never submitted his mathematical model for independent review. The model he refers to, described in a paper published by his student (Zhang et al, Application Of Numerical Methods For Crashworthiness Investigation Of A Large Aircraft Wing Impact With A Tree) is very much simplified and far from real wing structure of the Tu-154M with oversized elements. Real world examples prove that collisions with large trees destroy aircraft wings.

“...flotsam (wing) debris which had landed, and was caught, on the tree (...) evidences mid-air wing explosion event before the aircraft reached the tree's position”

This opinion is highly disputable. Fragments that were torn off the wing structure had the velocity much reduced by the collision and could easily get entangled in tree branches.

“visible signs of the fire on the aircraft center wing box”

Sooting visible on the structure was caused by the post-impact fire, that also charred the grass below it. By the way, it's a fragment of wing spar, not a wing box.



Fig 10: Soot on the fragment of wing spar was not left by explosion, but by small post-crash fire that also burnt the grass

“the front portion [of the fuselage] landed upright”

None of fuselage parts "landed upright". After the aircraft broke up on collision with the ground, parts of the airframe rolled in a random manner before coming to a stop. Total destruction of the top of the fuselage and virtually intact bottom of its surface prove that the aircraft collided with the ground in an inverted position.

“Location of parts from presidential suite at the main crash site, at distance 28 m transverse to the direction of impact (points A and C)”

Several detailed photographs taken at the point C reveal no part resembling fuselage wall with windows, but fragments of the right wing instead.

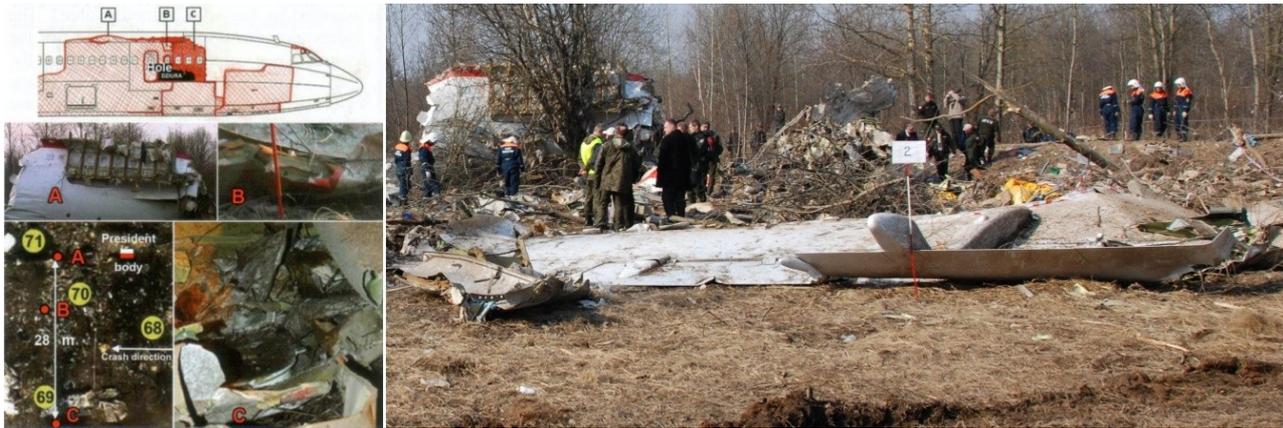


Fig 11: No fragments of the fuselage at “point C” (right), just fragments of the right wing. Remains of the president's suite (“point A”) visible behind a tree.

“a crash test of a Boeing 727 in the Sonoran Desert (...) similar to PL-101”

The “727 crash test” was in fact an off-airport crash landing performed solely for the purpose of the Discovery Channel documentary and not a real scientific test.

The Smolensk crash was entirely different, because the Tu-154M crashed inverted into wooded area.

“Professor Krystyna Kamińska-Trela and professor Sławomir Szymański (...) have proven that (...) presence of traces of an extremely potent explosive hexogen RDX can be proven with a high likelihood”

This opinion turned out to be unsupported by facts. What's more important, no debris exhibit marks typical to explosion, like sooting, petalling or pitting.

“Sudden loss of electrical power when the airplane was still flying 49 feet (15 m) over the ground and 230 feet (70 m) before first marks of impact with the ground. This loss of power lead to instantaneous cut off black box recordings and 'froze' memory of flight management system (FMS) computer”

False. Recorders stopped on impact with the ground. Last GPS position recorded by FMS corresponds to the ground scar.

“Total fragmentation of the airplane structure on small and numerous fragments along the flight trajectory in last few hundred yards and the crash site. Fragmentation of the Polish Air Force Tu-154 airplane structure exceeds fragmentation known from high velocity impacts and caused by explosive destruction”

Wrong. Total fragmentation was restricted mainly to the upper portion of the fuselage, which contacted the ground first and was smashed by heavy parts of the aircraft. Bottom part of the fuselage and its walls in the rear part remained mostly unfragmented. On the contrary, after SR111 crash with water the McDonnell Douglas MD-11 disintegrated into some 2 million pieces.

“Numerous and small airplane fragments found around 656-984 feet (200-300 m) before beginning of the crash site, some of them with evidence of heat”

No fragments from the fuselage were identified before the ground scars marking the first impact with ground. Fragments found before this point were torn by collisions with trees. A piece of metal with signs of heat was found by Polish tourists quite a long time after the accident in burnt grass.

“Groups of small airplane fragments (including fuselage parts) found embedded in ground under acute angle just before crash site suggesting that high velocity fragments separated from the airplane before hitting the ground”

Very shallow ground penetration at an angle aligned to flight direction. No fuselage fragments confirmed.

“Groups of small airplane fragments with the evidence of heat found dozens of yards before the crash site”

A few small fragments exhibiting signs of heat were probably ingested by engines after being torn off from airframe in collisions with trees as some bear marks left by tips of rotating turbine blades.

“Evidence of heat on several parts of the airplane structure on the crash site”

Marks of fire were left by post-crash fire on the wreckage AND grass.

“Outwardly rolled (“opened”) edges of the large parts of the fuselage suggesting internal pressure”

Photos show edges bent outwards as well as inwards.



Fig 12: Edges of fragments were bent outwards as well as inwards

“Rolled edges of several smaller parts of the aircraft structure section in the direction from inside out, e.g. on the left wing”

Deformation is consistent with impact at high angle of incidence.

“...all victims were subjected to the G-force over 100g. Measured and calculated G-force during test crashes and similar incidents suggest often survivable 5-10 times weaker acceleration. Also, some bodies were found on the crash site without clothes, what suggests blast and/or in-flight breakup”

The G-force in the Swissair 111 crash mentioned above exceeded 350 g.

Condition of victim's bodies was consistent with crash conditions and aircraft disintegration.

“Detection by field asymmetric ion mobility (FAIMS) spectrometers and ion mobility spectrometers (IMS) around 700 positive explosives signals during screening tests taken 2.5 years after the crash”

False positive indications during screening tests are normal and require further laboratory tests of suspicious samples.

“Analytical signals of explosives (mainly RDX, PETN and TNT) found during laboratory tests in around 150 chromatograms from samples taken from the airplane and its equipment 2.5 years after the crash”

False. Forensic laboratory tests performed in the Central Forensic Laboratory of the Police (CFLP) Research Institute did NOT reveal any traces of explosives.

“...the Tu-154M crew (...) initiated a go around manoeuvre. (...) the plane (...) flew over the birch tree”

The go around manoeuvre was initiated too late, after the plane descended below the airfield elevation (!!!).

The aircraft impacted the large birch with the left wing, losing a part of wing including the left aileron. There is strong material evidence proving the collision, including fragments of the wing structure embedded in the broken tree trunk and pieces of wood embedded in the separated outer wing part.

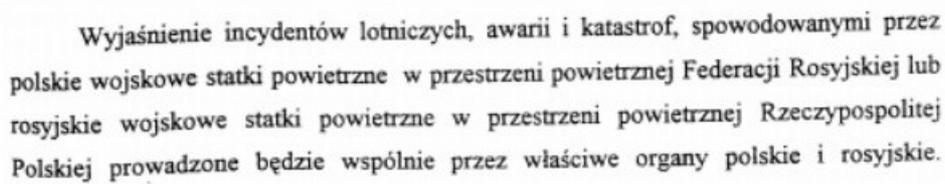
“As the result of the crash, the plane disintegrated into over 60 000 fragments (...) The overall aircraft debris was scattered over an area of over 1.5 sq km”

The main debris field was quite small (60 m by 130 m) and elliptical in shape, typical for such accidents.

“The Russian authorities adopted Annex 13 of the Chicago Convention as the basis for the investigation (...) despite existing Polish-Russian [agreement] concerning the rules for investigating military aircraft [accidents] ultimately leaving the entire investigation and all the evidence in the hands of the Russian authorities, enabling data retention and manipulation of evidence”

The Polish-Russian agreement mentioned here is a very general 9 page document with only 6 (six) lines of text regarding aviation incident/accident investigation, stating that “investigation will be conducted jointly by respective Polish and Russian organizations with access to necessary documents limited by state confidentiality rules”.

Polish commission performed independent investigation with access to necessary evidence, resulting in publication of the Final Report in July 2011. There are no clues that would suggest manipulation of evidence.



Wyjaśnienie incydentów lotniczych, awarii i katastrof, spowodowanymi przez polskie wojskowe statki powietrzne w przestrzeni powietrznej Federacji Rosyjskiej lub rosyjskie wojskowe statki powietrzne w przestrzeni powietrznej Rzeczypospolitej Polskiej prowadzone będzie wspólnie przez właściwe organy polskie i rosyjskie.

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Jednocześnie Strony zapewnią dostęp do niezbędnych dokumentów z zachowaniem obowiązujących je zasad ochrony tajemnicy państwowej.

Fig 13: The Polish-Russian agreement of 1993 contains only six lines of text regarding aircraft incident/accident investigation.

The Polish state commission determined that the accident was caused by descent below the minimum descent height (MDH) with excessive vertical speed in meteorological conditions preventing visual contact with terrain and delayed initiation of the go-around manoeuvre. This led to collision with a tree that separated a part of the left wing with aileron that in turn caused loss of control that resulted in collision with ground.