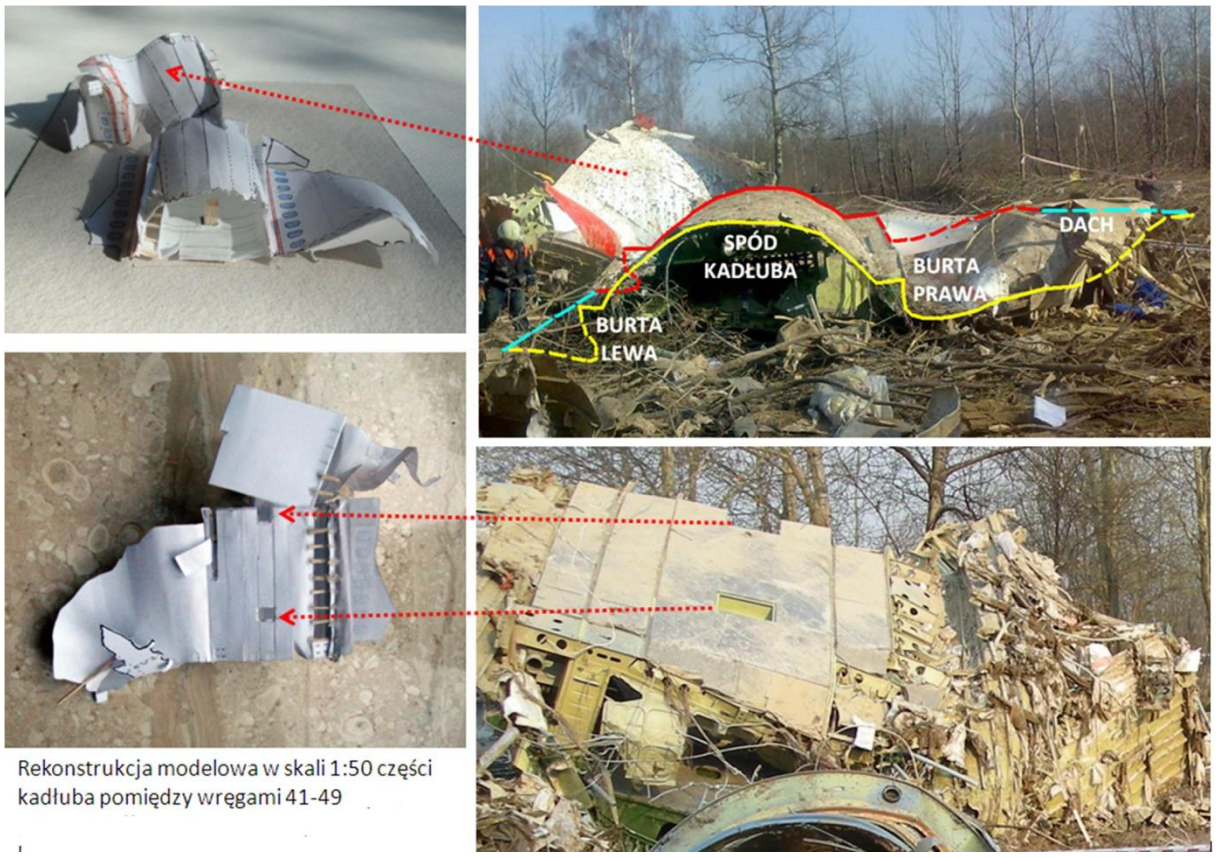


Fig. 44. Image of the fuselage destruction with both sides of the fuselage opened and thrown outwards.

Disintegration of the galley is shown in fig. 45. The smaller than 8m^2 galley area was found scattered over more than 1300m^2 in small fragments.

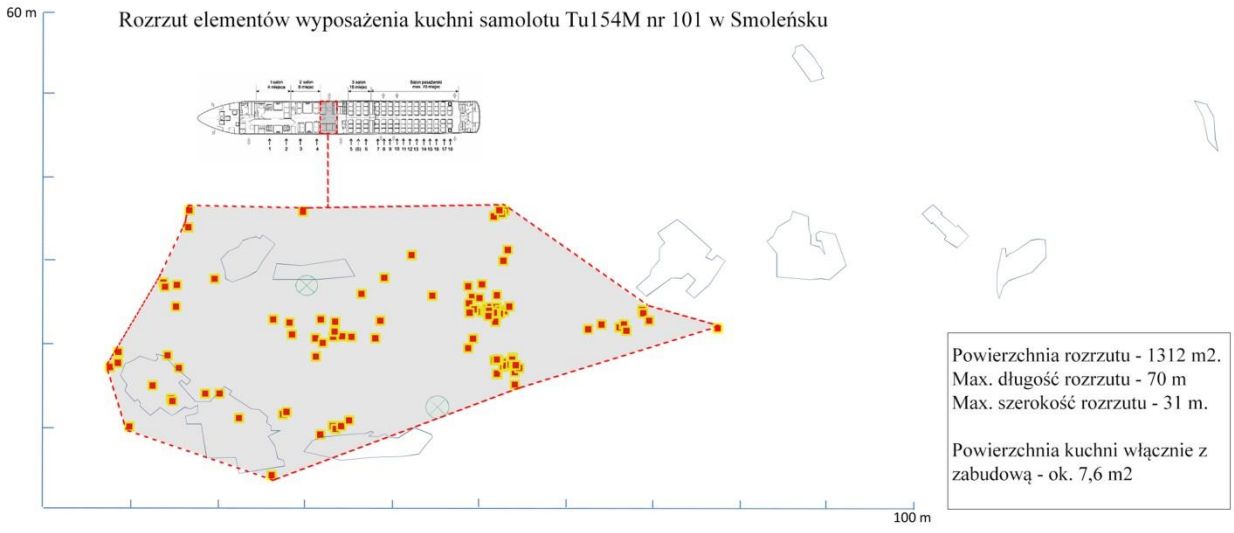


Fig.45. Parts of the galley before the third salon were distributed in the shown region on an area of 1312m2.

Experts of the Polish Prosecutor's Office found traces of explosive materials on 175 pieces of the seats using special sniffing equipment and instruments. Source: CLKP E-CHE-0/2 p.32

Occupants

All 96 occupants on board died. All occupants were thrown outside of the fuselage, as were the seats, on which they were sitting, including the floor-covering with insulation. At the beginning of the crash site, apart from pieces of the plane, only small, torn pieces of the bodies of victims were found, and numerous internal organs identified. This shows that even before the plane hit the ground the bodies of the occupants sitting in the center part of the plane (lounge no.3) were damaged and torn into pieces. (Fig. 46).

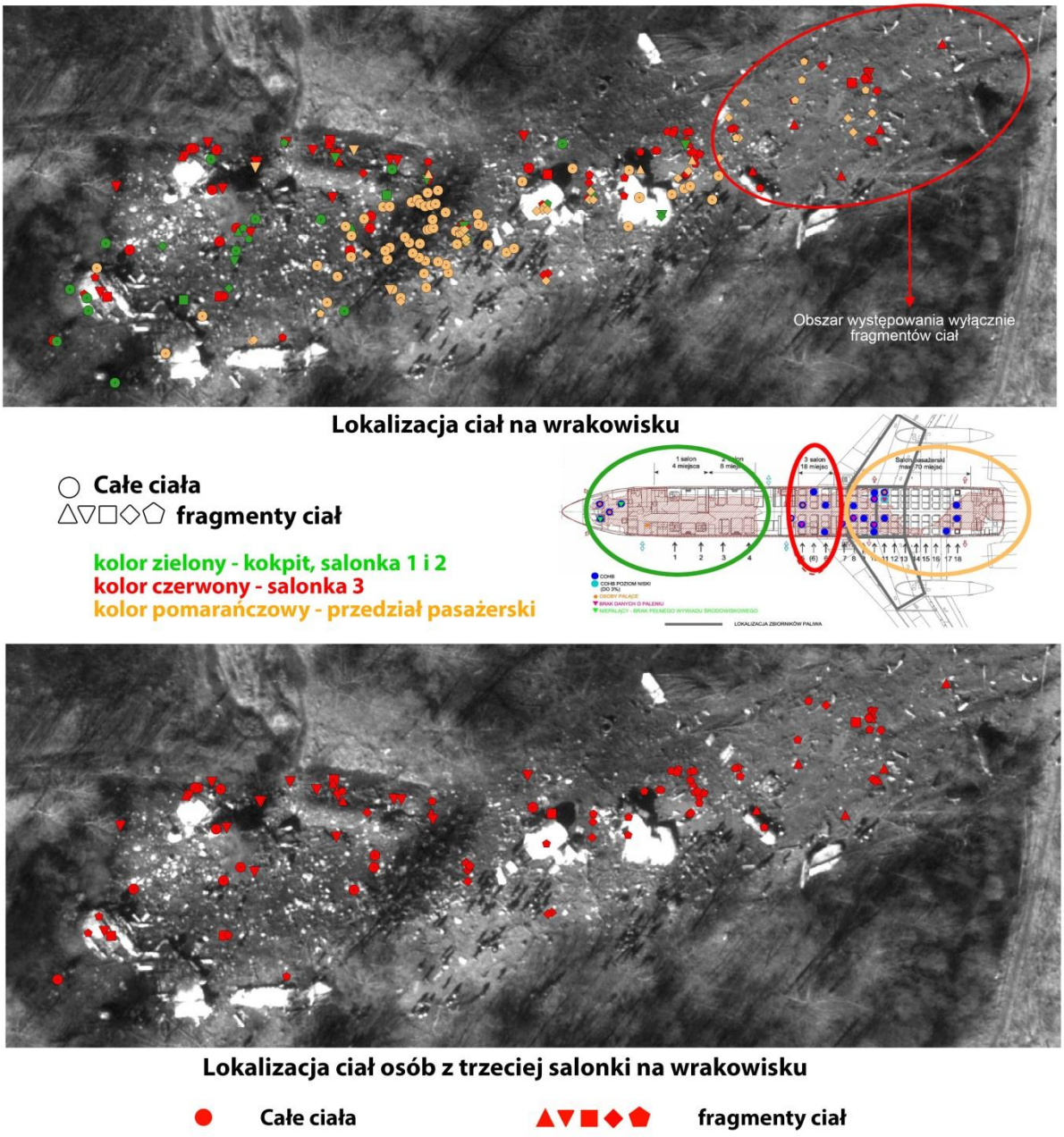


Fig.46. Location of bodies on the crash site. Only small body fragments and intestines were found in the area circled at the top picture, often far from the main body. The fuselage was more than 6m above the ground when passing this area. Whole bodies are marked with a red circle.

Parts of the body were found at the beginning of the crash site, before the fuselage hit the ground. This shows that the movement of the body parts was opposite to the movement of the plane. In all the cases identified these were body parts of people sitting at the front part of the plane, especially in lounge 3. At the same time it is important to say that the door rammed into the ground was found nearby, as well as the galley (distributed on 1/3 of area of the crash site) and the left center wing.

Source: Archeologist report. Analysis of own pictures of the Committee

. More than 35 of the occupants were observed to have had partial or totally torn off clothes from their bodies. These were mainly the bodies of occupants located at the front of the plane starting with the 3rd lounge, where all the generals were sitting. Of the 20 people sitting in the 3rd lounge or in its immediate surroundings, clothes were completely or largely torn off 12 of the occupants.

As research quoted in literature shows, clothes can be torn off an occupant if he is subject to an air speed exceeding 460 km/h.
Source: experiments conducted in order to determine the reasons for the MH17 crash. A memo from a meeting between the members of the Committee and a member of the MH17 investigation committee.
In the case of Smolensk, the speed of the aircraft was about 265 km/h before the crash, so 58% of the critical speed.

In addition to mechanical damage to the bodies, there are a significant percentage of victims (25%) with extensive burns up to 40% of the body surface, some of which were found even more than 55 meters from the ground fire source.
Source: investigation files

In at least 12 cases, the fragmentation of bodies is also connected with a large linear dislocation of fragments of bodies on the surface of the main crash site, approx. tens of meters, scattered almost throughout the total length of the main crash site. Occupants and crew members who suffered those injuries occupied space near the aircraft bursting, near lounge no.3.

The length of scattering of the bodies of the cockpit crew was approx. 35 meters
Source: Investigation files

The body of one of the occupants, sat at the rear of the plane was rammed into the rear wall of the toilet (without the seat backrest) in such a way, that the wall was folded around the body of the occupant. The damage of the body and its location show that the body was moving in the opposite direction to the moving plane. Another occupant was thrown in the air in such a way that he fell between the reverse center wing and the flap.

Source: Analysis of pictures of the Committee

Initial evaluation, resulting from the study of the previously analyzed single person sitting in salon no. 3 indicates that the cause of her death could have been the impact of a detonation wave

resulting from an explosion. According to experts, the evidence for this is the unusual range of body damage.

In the same situation there were at least 12 out of 20 people sitting in or near the salon.

Firefighting-, medical-, and rescue services

A part of the firefighting units, which were supposed to secure the landing of the plane TU-154M with the President of Poland on board, were not located at the airport but- which was not standard procedure- at Kutuzov street, in the direction of the landing approach. When the crash occured those units were the first on the scene, arriving within 3 minutes. The Head of the Center for Crisis Situation Management of the Ministry of Emergency Situations of the Smolensk Oblast was waiting for the arrival of the TU154M plane together with firefighting units in the vicinity of Kutuzov street.

Medical services- there were no military medical personnel at the airport before the landing- nor medical services or doctors. The medical staff from the regional hospital in the village Pokornovo, more than ten kilometers from Smolensk, covered their shift at the airport instead. A couple of minutes after the crash the second medical team from the same hospital were called. While heading to the crash site, they were told to go back to attend a different emergency because none of the passengers on board survived.

Rescue services: Before the landing of the Polish plane, an emergency team from the city of Smolensk (to prevent and manage extraordinary situations) was waiting. Those first-aiders were first to arrive at the crash site. They were followed by the rescue team from the Special Work Unit on special vehicles. Within the next hours other rescue teams from the Ministry for Emergency Situations followed, like: LIDER (from Ramienskoye), Military Unit 96 from the Rescue Center (from Korakovo, Tulski Oblast), Rescue Units from Reytowo, Kaluga, Mozhaysk, Ruzy, Luberec, Zvienigorod and other cities. Functionaries of the majority of those units, during the rescue action, did not have their identification badges on their clothes. According to the testimonies of the police functionaries, their cell phones were taken away from them by their superiors.

Securing services- Directly after the crash the following services were present: FSO, FSB, OMON, SPECNAZ, SORB, police units. All those units created a cordon around the place of crash and police units, in addition to that, set blockades on the Kutuzov Street.

ANALYSIS AND EXPERIMENTS

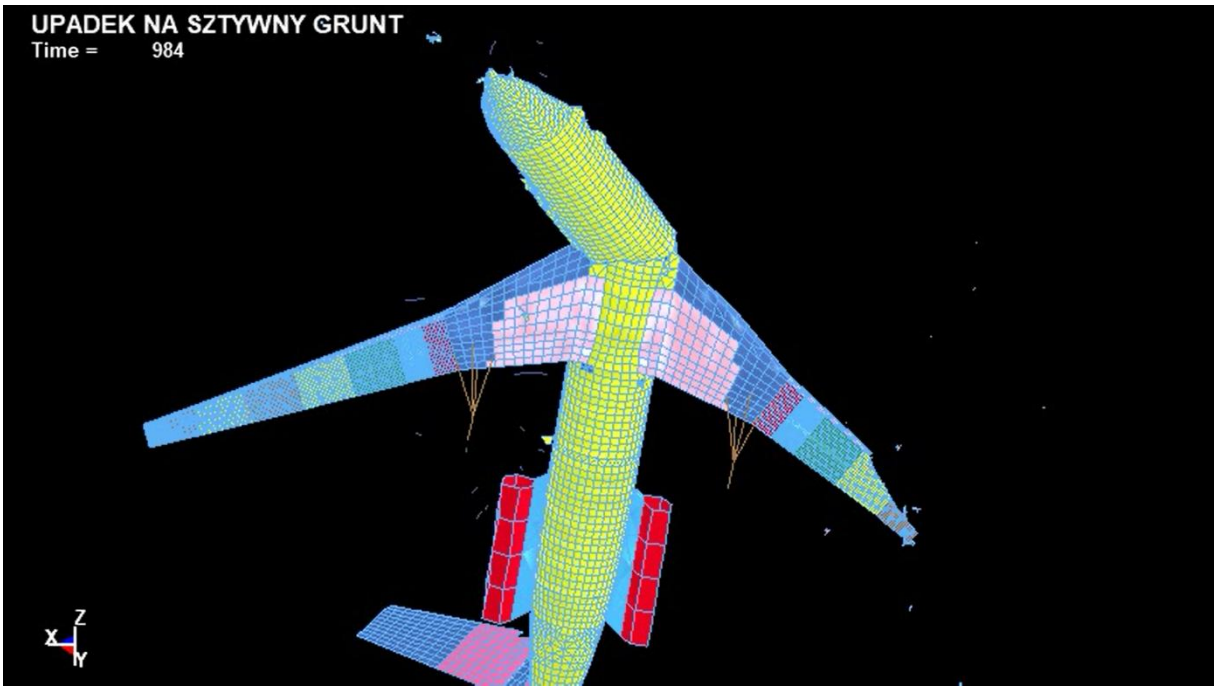
Falsification of the hypothesis from Miller and MAK reports concerning the destruction of the entire plane after hitting the ground

The main objective of the research was to state how the plane disintegrated when it hitt the ground. Substantial data includes : the velocity and aerial angles, which can be called „initial state". The main tool for analysis will be the FEM (Finite element method), which is mainly used when a physical experiment is not a practical option. In order to see the results we built a construction model according to FEM and recreated the plane's original state according to the MAK and Miller reports. After conducting a simulation we compared the results with the actual crash. An obvious benefit to this comparison would be to see whether the plane falling in this initial state would be destroyed in a way similar to the actual one, just as MAK or Miller state

The simulation was done up to 1000 milliseconds, so 1s, and in this time the plane travelled 46.6m. The progressing velocity at that moment dropped to approx. 20m/s and the destruction of the construction did not have deepening tendencies (of course a certain delay took place)
The skin of the fuselage was 1.5mm. The stringers of the fuselage with an omega cross-section, modelled as lines, had a wall thickness of 2.0mm.
Particular fragments, like the one we see on the pictures, appeared due to the destruction of the elements joining them with the rest of the construction. Elements, which are destroyed (torn), disappear from the calculation and the screen. (In reality those elements create the torn edge of the remaining construction). Fragments from the destroyed fuselage are mainly pressed inside and because of that they are invisible in those pictures.
Properties of aluminum alloys used for the model construction (yield limit, durability and maximum elongation)

2024-T3: F_y = 334 MPa, F_u = 448 MPa , e = 16%
7075-T6: F_y = 493 MPa, F_u = 545 MPa , e = 9% (Only stringers)

They are analogical to the corresponding alloys used in TU-154M
The angle position of the plane at the beginning of the crash was given according to the Miller report. In reference to the description of ideal levels and straight flight, those angles were as follows: pitch 6degrees (nose down), yaw 20 degrees (nose left), and roll: 150 degrees (left wing down). The initial state of the plane, determined by those angles and velocity, dictates the order in which particular pieces hit the ground.



Rys. 47. Simulation of the disintegration of an airplane hitting stiff ground (concrete). The aircraft only breaks into a few parts.

Conclusions

1. The simulation of the plane's destruction shows a completely different destruction of the construction than the one found at the crash site.

2. The initial state of the falling plane was described in the MAK and Miller report and confirmed in supportive works [3]. It seems that this state was far from reality , which is why the simulation presented unrealistic results.
3. The above-mentioned crash reports assume that the plane, while hitting the ground, should disintegrate into thousands of pieces, according to what was found on the crash site. The results of simulation show clear destructions of the construction; however the plane is still there and not only its scattered segments.
4. Results of the simulation show that the assumptions of the above-mentioned reports concerning the destruction of the construction are wrong.
5. If there was only an impact with the ground, the pieces, which fell off, should be in one long line. It is not possible that the fragments could be scattered tens of meters to the side.
6. The assumption (for calculation comfort) that the plane fell on a concrete panel, instead of soft ground, could influence some features of the disintegration but do not change its general character.

Simulation of door impact into soft ground - NIAR

The left passenger door No. 2 (No. 823) with a mass of about 77kg located in the fuselage in the front of the left wing was found completely driven into the ground, to a depth of more than 1 meter. It was located 34 meters downstream (West) from the over 6m tall tree located between the ground traces. This passenger door was found in its locked position, completely detached from the massive door frame. The two bottom hinges of the left passenger door No. 2 (No 823) are each rotated 90deg compared to their orientation in the closed door position

Source: Materials of the Committee.

The vertical speed of the aircraft just before the impact with the ground was V = -12 m/s according to the FSM memory reading at the moment of power failure.

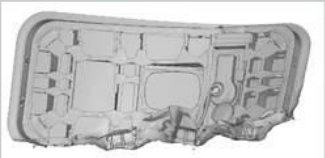
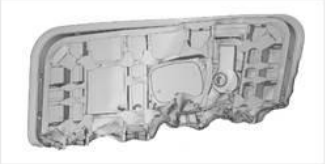
Simulations done by the independent National Institute of Aviation Research (NIAR) in the US show the required vertical speed of the left passenger door was more than $V_{z_door} > 120$m/s in order to produce the observed door damage and full penetration into the ground. (This means the vertical energy of the door when penetrating into the ground was 100 times greater than the kinetic energy it possessed by the vertical velocity of the aircraft)

The 100x increase of vertical kinetic energy of the door, with a mass of 77kg, requires a large acceleration and force behind it.

No buildup of soil in front of the door (in direction of flight) or cave/empty space behind the door can be observed.

On the inside of the left passenger door No. 2 (No. 823) numerous cracks in the aluminum cover can be seen. Such cracks should not be generated during the flight.

Analysis Summary

Case	Vertical Velocity (m/s)	Horizontal Velocity (m/s)	Penetration at Door Center (m)	Door Damage	Notes
5	100	20	0.69		More than 50% penetration of the door. Half of the door is fully penetrated. Extensive damage on the door
7	125	20	0.68		Full penetration of door. The penetration value is low because door is crushed and has very high deformations.

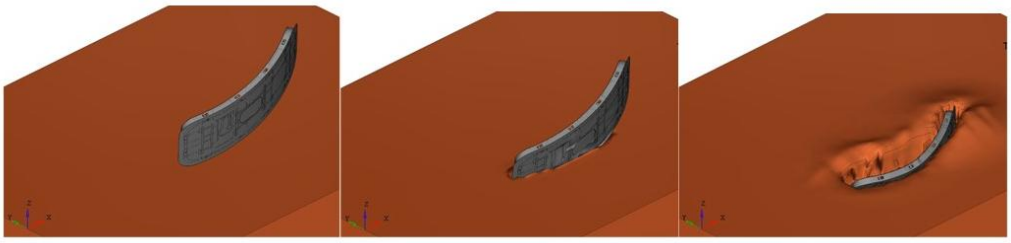


Figure 48 Shows results from NIAR's simulation of the door hitting soft ground and the door buried 1meter in the ground as Russians were digging it out by hand.

When pulling the left passenger door 2L, driven over 1m into the ground, a human hand and forearm were found near the door handle. Source: Images of the door driven into the ground
Source: Pictures of door rammed into the ground.

No other body parts were found around the door (no.823), indicating that the hand was separated from the rest of the body before the door hit the ground.

Simulations and results from various crashes with the participation of similar aircrafts falling with similar vertical velocity show, that the aircraft normally breaks into 3-5 bigger pieces with a visible line of separation. The breaks usually occur where the stiffness makes relatively large changes: On both sides of the center wing, behind the cockpit and in front of the tail part.
Source: Materials of the Committee

Analysis of last second of trajectory

Assumption: The severely damaged trees on both sides of Kutuzov Street are caused by the aircraft.

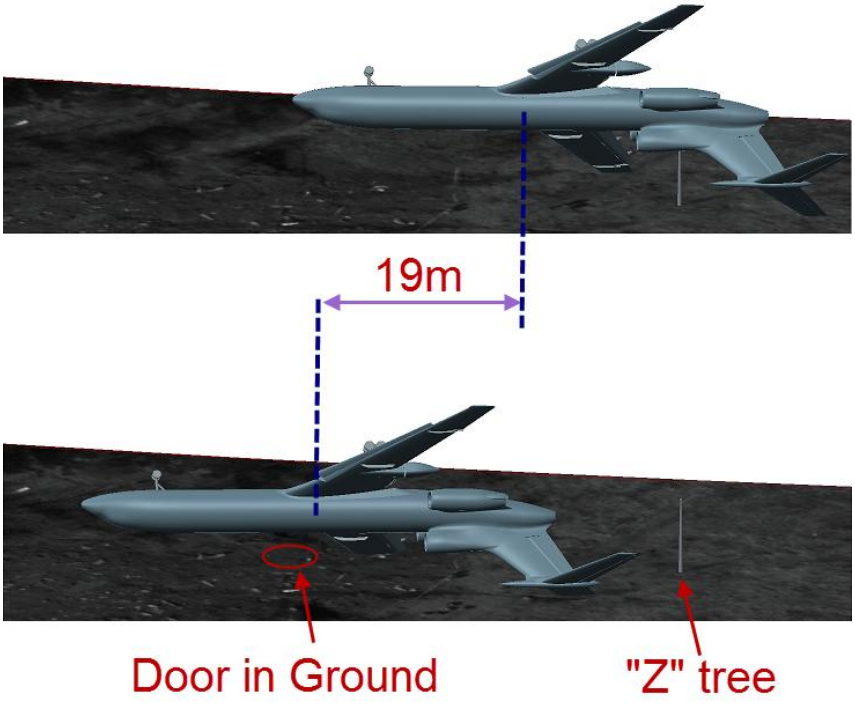


Fig. 49. The position of the plane the moment it passes the Z tree and the position of the plane above the rammed door.

The distance between the trees west of the street and the tree marked "Z" is about 103m and the time it takes to travel this distance can be worked out as Δt= 103m/75m/s = 1.37s

The vertical velocity by this method works out as $\Delta H/\Delta t$ = (25m-10m)/1.37s = 15m/1.37s = 11m/s

The minimum height 19m after passing the tree marked "Z" works out as (10m - 19m/103m*15m) = 7m

This is the height of the center of gravity of the aircraft at the moment the aircraft is above the position where the door was found buried 1m into the ground.

Confirmation 1:

Assumptions:

1.) Both flight management systems (FMS1 and FMS2) were working until the moment of the freeze (power loss).
2.) Power was lost at the same time for FMS1 and FMS2.
3.) Forward horizontal velocity of aircraft is about 75m/s.
4.) Tree located 8m before the ground traces in the area passed by the aircraft is about 6-7m tall.

5.) A 6-7m tall tree (marked Z) in the flight path of the TU-154M located about 8m before the first ground traces near the main crash site was not cut or damaged by the aircraft when it passed this location.

The FMS is designed to capture and store important data to non-erasable memory in the event of a complete loss of electrical power. Data on the input side of the FMS is newer than internal FMS data (earlier captured). (GPS positions are updated with a refresh rate of 1s).

The internal baro corrected height captured by the FMS1 at the moment of freezing is +14.3m above RWY.

The baro corrected height captured on the input side of the FMS2 at the moment of freezing is +6m above RWY.

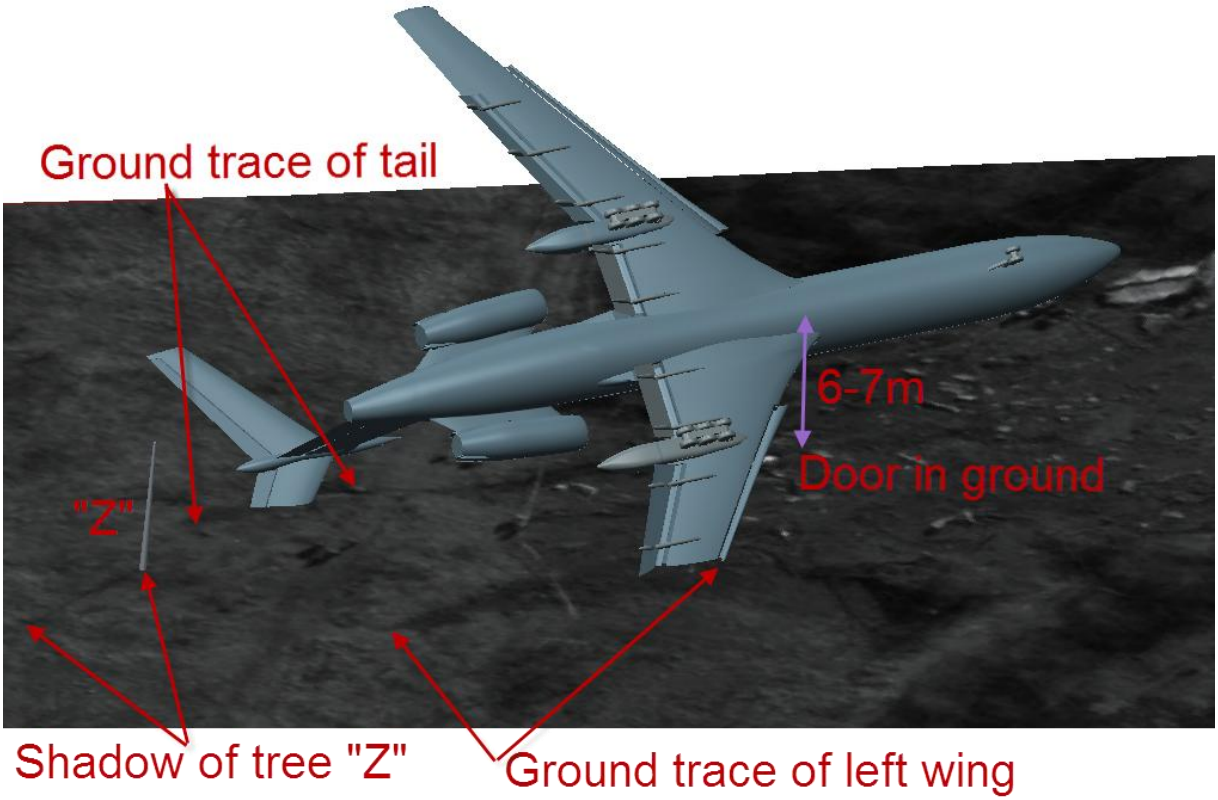
The distance between the recorded positions of the FMS1 (internal) and the newer position of the FMS2 (input) is about 40m.

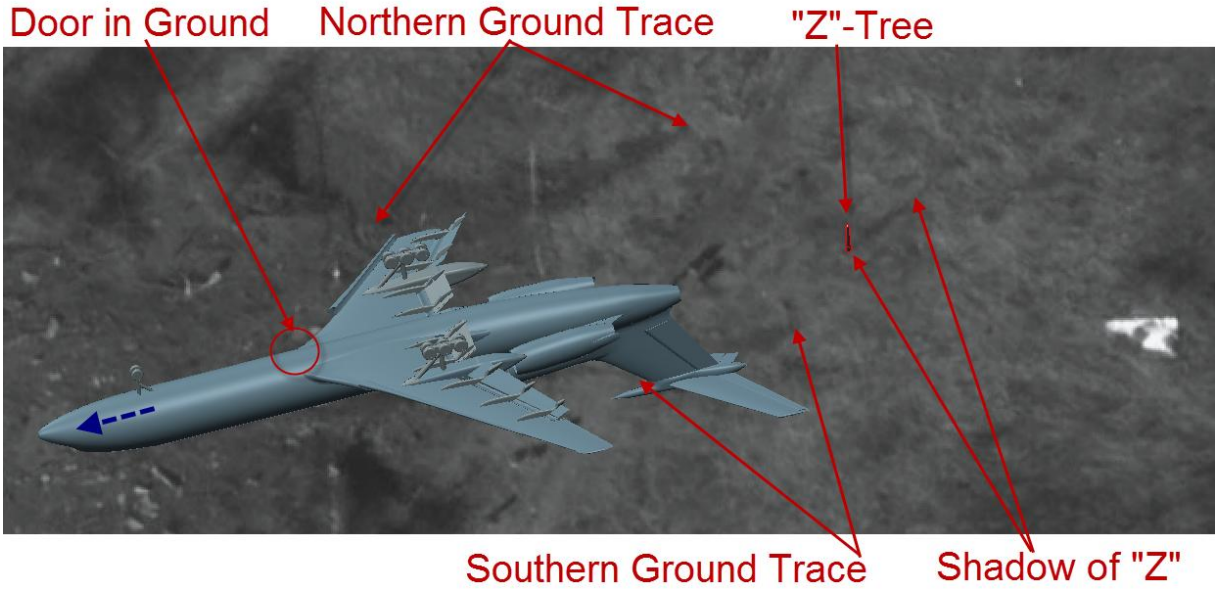
Confirmation 2:

Assumption: The ground traces at the beginning of the crash site were produced by the remains of the left wing and remains of the left horizontal stabilizer.

Considering the damage to the trees seen on both sides of Kutuzov street the height to the center of gravity (COG) of the aircraft when it passed the trees on the West side (nearest the crash site) was about 24m -26m above the crash site .

The 6-7m tall tree marked "Z" on following figures and under the direct line of flight was undamaged by the aircraft.





Pic.50. The moment the plane hit the ground

Analysis of the ground traces assumes the left roll of the aircraft to be about 130° when the remains of the left wing touched the ground at the beginning of the main crash site. They assume the height above the ground was about 6-7m when the fuselage was positioned with the left passenger door above the location it was in the ground.

The ground traces of wing come to a stop at the moment the fuselage was above the position of the door in the ground, and from this point the aircraft was found scattered into thousands of pieces without creating a crater.

CONCLUSION:

The aircraft was a minimum of 6m above the ground (RWY) when the left passenger door No.2 (823) was shot to the ground. The height of both FMS1 and FMS2 at the moment of power loss was 6-8m.

The vertical velocity by the FMS was about 12m/s and this is confirmed by the analysis of tree damage resulting in a vertical speed of 11m/s.

Analysis by NIAR shows that the velocity of the door when shot into the ground had to be greater than 125m/s. It is reasonable to assume, that the reason for the power failure of both flight management systems is connected to the event causing the door to be shot to into the ground. This requires an acceleration from 12m/s vertical velocity to more than 125m/s vertical velocity of the left passenger door no.2 (823), thereby increasing the vertical kinetic energy by more than 100 times, and such increase in energy can only be the result of sudden high internal pressure, i.e. explosion above the ground.

This is again confirmed by the fact that the ground trace of left wing (and tail) come to a sudden stop at this position where the left passenger door was shot into the ground.

Pyrotechnical experiments

Experiments carried out by the Committee on a model of the occupants part of TU154M on a 1:1 scale show that the destruction of the plane observed in Smolensk could not be the result of a fuel explosion. (Fig. 51).

Experiments conducted by the Committee on a model 1:1 of the occupant's part show that such disintegration, as observed in Smolensk, can be the effect of one or many detonations of air-fuel charges, with special consideration given to a thermo-baric charge with a longer tension impulse propagated inside the fuselage before hitting the ground. (Fig. 52).

Fig.51. Explosion of jet-fuel in the occupant's part of the fuselage resulting in a large opening but not resulting in destruction into small pieces.

Fig. 52. Explosion of a thermo-baric charge in the occupant's part of the fuselage resulting in the complete destruction of the fuselage and the formation of a lot of small debris.

Source: Report on experimental results from explosion in an object imitating the occupant's area in the fuselage, Vol.2 2017.

The same experiments show that a thermo-baric explosion can leave only minor traces of explosive materials on the debris of the plane and visible only in minor quantities during spectrometric analysis.

Source: Reports on explosive experiments on an object imitating the occupants part of the fuselage.

Pathological expertise

A spatial explosion (thermo-baric, as well as air-fuel) has to create a number of pieces and micro pieces from the container, where the charge is placed, or from objects being in its vicinity.

Those pieces might or might not have a metallic character. In the latter case they will not be visible on any X-Ray pictures and also not on CT. Those pieces cause characteristic damage of the bone structure (with beveling) but- what is especially important- practically impossible to notice during a routine postmortem examination, even with a CT. In order to make that damage visible (less spectacular compared to others in such circumstances), it is necessary to prepare the bone fragments (sometimes by cutting a particular fragment) and to analyze them after gluing them together in an anatomical position. Without this gluing the chances of finding such changes are close to zero. The postmortem examination, (Russian, as well as Polish ones after the exhumations) until now ignored those issues and gave no chance of finding traces of this type of explosion.

Fig. 53 Medical phantoms inside the model of the occupants part of the plane

SUMMARY OF THE EVIDENCE OF EXPLOSIONS (included in the report).

1. Post explosive destruction on the wing and pieces.
a) Post explosive curls of more than one turn.
b) Deformation of pieces due to high internal pressure.
c) Dispersion of many pieces in all possible directions with reference to the direction of flight (also to the back and sides).
d) Identification of the internal parts of the wing hanging on treetops.
e. Destruction of slats and parts of the nose of the detachable part of the wing, pointing to internal pressure.
2. No traces of hitting a terrain obstacle on the leading edge of the wing.
3. Experiments conducted by the Committee confirm the possibility of the wing being cut with an explosive material and causing damages analogical to that observed in the case of the destruction of the TU-154M wing.

The explosion of the central wing box (pic37) was the main reason for the destruction of TU-154M before hitting the ground. The explosion, which happened in that place, destroyed the box, leading to fragmention of the left center wing, together with the front spar and soothed ribs. The spar flew 70m west. The third spar was destroyed as well. The explosion destroyed salon 3 killing all passengers inside and throwing the body parts over the entire crash site and in the area before the fuselage had made ground contact. At the same time the explosion wave blew out the left passenger door ramming it 1 meter into the ground and blew out thousands of pieces of the galley, which were scattered over 1/3 of the crash site. The explosion wave heading to the tail destroyed this part of the center wing and curled the left and right side of the aircraft outwards with the roof to the outside.

1. Numerous pieces are soothed and burned and spread over 100m before the plane hit the ground.
2. The aircraft hitting at a shallow angle disintegrated into tens of thousands of pieces
3 No crater from a 76ton plane hitting soft soil sliding up to 150m can be seen on the crash site.
4. A total destruction of all seats. The armrest, frame, and seating are disintegrated.
5. The internal part of the aircraft is completely without floor panels and insulation.
The left passenger door was rammed 1m in to the ground with a speed 10x the speed of the aircraft (12m/s), i.e. its vertical kinetic energy was increased by 100 xs.
7. The sides of the central part of the fuselage right above the place of explosion are curled outwards.
8. The destruction of the galley, being close to the epicenter, was scattered in small fragments over an area of 1300m2.
9. Characteristic body damage:
a) Total defragmentation of dozens of bodies sitting in the salons near the center(s) of explosion and their dispersion over the entire crash site.
b) Small body pieces at the beginning of the crash site (1/3 of entire crash site) before the fuselage made contact with the ground.
c) Numerous large burn-injuries of bodies found outside of the fire zones.
d) Clothes were completely or nearly completely torn off a large number of the bodies (35).
10. Identification done by CLKP experts in the fall of 2010 concerning a massive presence of traces of explosive materials, especially present on the seats.