Damage to the cockpit gives a clue to loss of flight MH17

September 11 2014, by Geoffrey Dell

Some of the debris from the Boeing 777 Malaysia Airlines Flight MH17 plane crash site. Credit: EPA/Jerry Lampen

Investigations into the downing of Malaysia Airlines flight MH17 have revealed the aircraft's cockpit was punctured by a number of "high-energy objects".

The Dutch Safety Board has revealed the findings this week in a preliminary report into the downing of the passenger aircraft in the Ukraine on July 17. The Boeing 777 had just left Amsterdam airport with 283 passengers and 15 crew on board, heading for Kuala Lumpur airport in Malaysia.

The report confirms that the flight was proceeding as planned, at 33,000 feet and above the level of the restricted airspace over the Ukraine. It was communicating with all relevant air traffic controllers until about 1.20pm local time when the MH17 air crew stopped responding.

The wreckage of the aircraft was later found spread over a large area (10km by 5km) near Rozsypne and Hrabove in eastern Ukraine, an area held by separatist rebel forces.

No malfunction of aircraft

The recovered flight data and voice recorders showed no alert or malfunction in the aircraft and the report says the crew "gave no indication that there was anything abnormal with the flight".

So far the damage in the area of the cockpit is giving the strongest clue to what caused the accident. Australian Prime Minister Tony Abbott said the findings in the preliminary report are consistent with the Australian government's view "that MH17 was shot down by a large surface-to-air missile".

The photographs (one above) included in the Dutch report clearly show this damage is atypical to that evident on the rest of the fuselage skin surfaces, which can be seen in other photographs of the wreckage.

These new photographs clearly show sections of forward fuselage structure with multiple holes where the skin is bent inwards around the circumference of each hole. This is consistent with the penetration of small high-energy projectiles, which would be the case with the proximity detonation of the warhead of a missile.

There is also evidence of similar penetrations in the cockpit floor. This suggests some of the projectiles from any warhead entered through the

fuselage skin above the cockpit and then exited through the cockpit floor.

Under the cockpit floor

Part of the inside cockpit roof showing penetration by objects from outside. Credit: DCA/Dutch Safety Board

Below the cockpit floor of the Boeing 777 – as in most modern airliners – is the Electronics and Engineering (E&E) compartment, which houses most of the aircraft's avionics, flight-management computers and other critical "black boxes". Penetration of the E&E compartment by the high-speed projectiles would no doubt have caused catastrophic damage to critical control systems.

The evidence from the cockpit voice recorder and flight data recorder clearly show the aircraft operating quite normally with nothing unusual at all up to the abrupt end of the recording. This suggests that right up to

the time the power supply to the recorders was terminated operations were normal.

It would be easy to jump to a conclusion from that evidence that the effect of any missile detonation was indeed rapid. Yet there is a need for the investigation to continue to provide answers to other questions.

For example, it is possible, although maybe unlikely, that shrapnel from any missile severed the power supply to the recorders, causing them to stop recording, but the aircraft may have continued flying for a short time. The penetration of the cockpit area by shrapnel from a missile may also explain why the crew were unable to get any mayday call away if that were the case.

What the pilots can still tell

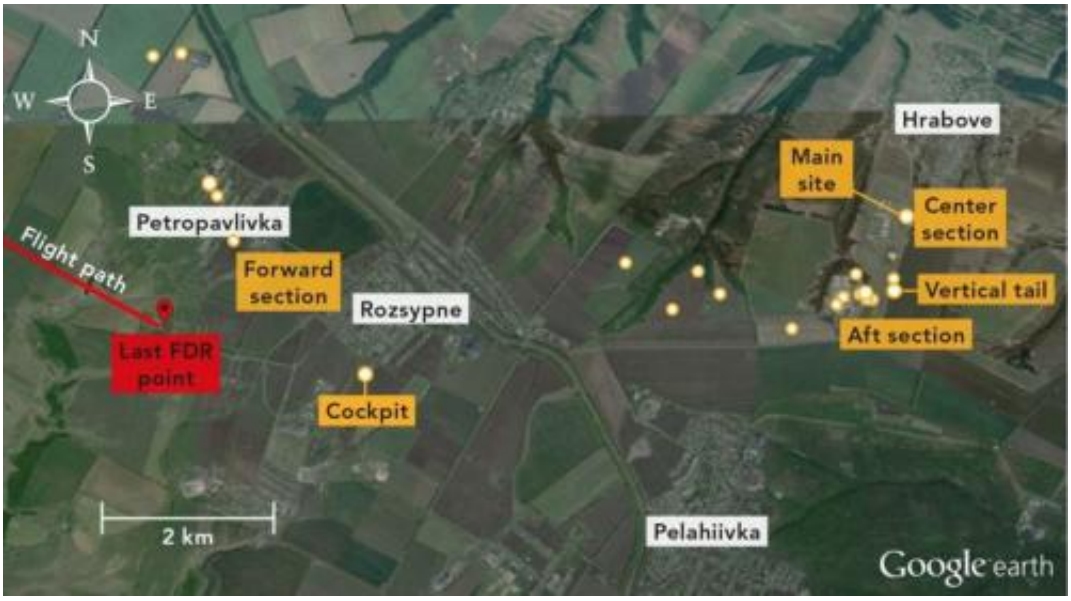
Post-mortem examination of the pilots, if their bodies were among those recovered from the scene, would also shed important light on those last critical seconds.

The identification of the bodies that have been recovered from the crash site is apparently continuing. There is still no word as to whether the bodies of any of the pilots or other cockpit crew have been found, identified and examined.

While the report says the distribution of the pieces show the aircraft "broke up in the air", the wreckage pattern itself will provide clues to those vital last few seconds.

Other parts of the aircraft have been found scattered across the crash site, including parts of the wings, both engines, landing gear and a portion of fuselage. The vertical tail was also located still attached to the upper rear of the fuselage.

It is of interest too that the area map of the flight path in the report showed the main accident scene many degrees off the flight path the aircraft was supposedly on.



The last location of the aircraft in flight taken from the flight data recorder (FDR). Wreckage distribution is grouped per section of the aircraft. Credit: Dutch Safety Board

This may have been due to simple errors in the depiction on the map. But if the map was accurate, it opens speculation that the aircraft did not immediately or completely break up when the missile detonated.

If so, the heavy components, in particular the engines, would most likely have followed ballistic trajectories to the ground on roughly the same bearing as the direction of flight.

Lessons to be learned

For those who are only interested in bringing those who perpetrated this heinous crime to justice, the rest of the investigation may appear somewhat academic. But it is important to know exactly what took place, in order to make sure all lessons are learned.

For example, if the aircraft did fly on, for any time at all, but the recorders stopped recording due to power failure, recorder design might need to be reviewed to prevent that happening in future. Understanding what happens to airliners when attacked by missiles will also very usefully inform future airliner and aircraft systems design.

Aviation safety has evolved over the past 100 years by learning from the failures that have occurred. Learning all that can be learnt from this disaster will ensure all those lives were not lost entirely in vain.

There seems no doubt the governments involved in the investigation will allow it to run its natural course. This must include the recovery of all the wreckage from the field so that proper forensic analysis can be carried out.

The longer that takes, the less will be learned with certainty from this tragedy.

Source: The Conversation