

9. Failure sequence

After the initial impact, the aeroplane broke up as follows:

- a. There was an almost instantaneous separation of the cockpit from the forward part of the fuselage when the pre-formed fragments penetrated the cockpit. The cockpit came to rest 2.3 kilometres from the last position recorded on the Flight Data Recorder.
- b. The aeroplane without its forward section continued flying along an undetermined flight path for about 8.5 kilometres to the east before breaking up further. The centre section travelled further than the rear part of the fuselage. This centre section came to rest upside down. Parts of the wreckage caught fire.
- c. The time between the start of the break-up and the impact with the ground could not be accurately determined, but the centre and rear parts of the aeroplane were estimated to have taken about 1-1.5 minutes to reach the ground. Other, lighter parts, will have taken longer.

10. Weapon used

The aeroplane was struck by a 9N314M warhead as carried on a 9M38-series missile and launched by a Buk surface-to-air missile system. This conclusion is based on the combination of the following; the recorded sound peak, the damage pattern found on the wreckage caused by the blast and the impact of fragments, the bow-tie and cubic shaped fragments found in the cockpit and in the bodies of the crew members in the cockpit, the injuries sustained by three crew members in the cockpit, the analysis of the in-flight break-up, the analysis of the explosive residues and paint found and the size and distinct, bow-tie, shape of some of the fragments.

11. Missile flight paths

The area from which the possible flight paths of a 9N314M warhead carried on a 9M38-series missile as installed on the Buk surface-to-air missile system could have commenced measures about 320 square kilometres in the east of Ukraine. Further forensic research is required to determine the launch location. Such work falls outside the mandate of the Dutch Safety Board, both in terms of Annex 13 and the Kingdom Act 'Dutch Safety Board'.

10.3 Excluding other causes of the crash

The Dutch Safety Board has investigated and analysed a number of different possible causes of the crash. The Safety Board excluded the following issues as being factors in the crash of flight MH17.

1. Flight crew

The flight crew members were properly licensed and qualified to conduct the flight. There is no evidence that the crew handled the aeroplane inappropriately or their flying skills being affected by alcohol, drugs or medicine.