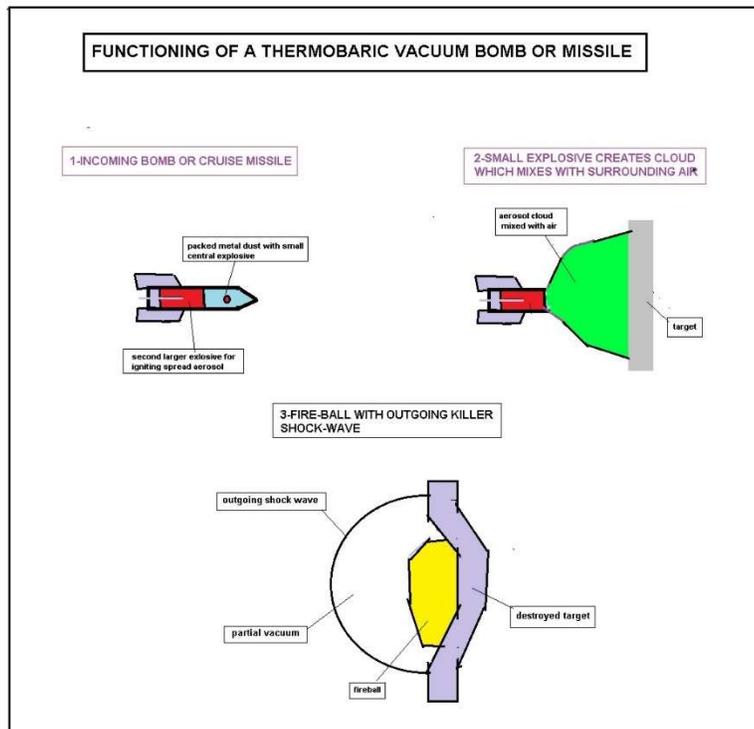


FUNTIONING OF A THERMOBARIC VACUUM BOMB

Recent videotapes from Ukraine indicate that the Russians may be using thermobaric bombs on civilians. Some of the bomb craters found in the backyard of Mariupol's main maternity hospital are sufficiently large to have been made by thermobaric bombs. Such bombs use dispersed powdered metal dust to ignite a huge non-nuclear explosion as high as 40 kilotons of TNT equivalence. (see "the father of all bombs" created by the Russian military in 2007). Such bombs, which can also be adapted for delivery by hypersonic cruise missiles, cause most of their damage by a strong outward propagating spherical shock which can cause major internal damage to the human body. Although not outlawed by the Geneva Convention, thermobaric bombs or missiles are deemed an unacceptable weapon of war against civilians by most countries in the world. It is our purpose here to discuss how thermobaric bombs work.

We begin with a little history. The first known, but very limited use, of thermobaric bombs was by the Axis Powers in WW2. Its inventor was the Austrian scientist Mario Zippermayr. He ignited dispersed charcoal dust with a conventional explosive to make his bomb. Undoubtedly the idea for such a bomb came to him from reported accidental explosions which had occurred earlier in dust filled flour and cotton mills and in coal mines. For the next 40 years, the research on such bombs was minimal with the US and Russia picking up the slack in the 1990s. Modern versions of thermobaric bombs have been used in Syria and Afganistan against military targets.

To see how thermobaric bombs or missiles work we have constructed the following three part schematic-



One begins with an incoming bomb or missile. The front part of the bomb consists of a small conventional explosive surrounded with packed metal dust (light blue). As the projectile gets close to a selected target the small front explosive ignites producing a dust cloud of fine metal particles (green). Next the second larger explosive (red) in back of the bomb is initiated within the metal aerosol cloud causing a massive explosion with a central fireball (yellow) and a strong outward moving spherical shock wave. The pressure behind the shock forms a momentary partial vacuum. This is why one sometimes also calls these thermobaric bombs vacuum bombs. The following photo shows two thermobaric bombs being ignited simultaneously. Note the outward moving semi-spherical shock waves-

TWO EXPLODING TNERMOBARIC BOMBS SHOWING LARGE
CREATED SEMI-SPHERICAL SHOCK-WAVE



(source Getty Images)

It is these shockwaves which cause most of the damage to both soldiers and civilians. As the shock passes across a body the sudden pressure change causes different motions for various body parts causing burst eardrums to destruction of alveoli in the lungs to complete vaporization of brain cells and other body parts. Some of these shock effects can be felt for hundreds of feet from the target. It does not mater if the victim is hidden or not.

**U.H.Kurzweg
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