

A Bomb to Bust the Deepest Bunkers

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Bomb in an air bubble

Despite the intelligence failure that led the Bush administration to believe Iraq had weapons of mass destruction, the Pentagon is pressing ahead with the development of technologies designed to destroy WMDs. Its latest idea is a bomb that can destroy deeply buried WMD storage bunkers by cutting through earth and concrete inside a bubble of air.

Traditional “bunker busters” are streamlined bombs that rely on sheer weight to force their way through soil, rock or concrete. But the new design has a blunt nose that forces the earth ahead of it out to the sides, creating a cavity the bomb can easily slide through, allowing it to reach much deeper buried structures than conventional bunker busters.

New Scientist has learned that the novel warhead is being developed for the Pentagon’s Defence Threat Reduction Agency by Lockheed Martin Missiles and Fire Control of Dallas, Texas, in conjunction with the US navy’s Surface Warfare Center at Indian Head, Maryland. The DTRA wants the warhead to carry an incendiary payload for incinerating chemical or biological agents.

The design builds on the US navy’s work on high-speed torpedoes (New Scientist, 22 July 2000, p 26), which reduce friction around themselves by creating a gas bubble called a supercavity. The Russians have had such a torpedo since the 1990s: called Shkval, it can travel at 360 kilometres per hour.

To create a supercavity that surrounds but doesn’t touch the body that created it, the object has to be travelling very fast – at least 180 kilometres an hour if it is in water. And the nose has to be flat to force fluid off the edge with such speed and at such an angle that it avoids hitting the surface of the body. But if this is to be achieved, the result is a supercavitating body with extremely low drag. Instead of being encased in water, it is simply surrounded by water vapour, which is less dense and has less resistance.

But supercavitation may not be limited to liquids. At high enough velocity a blunt-nosed body will force apart any medium it travels through, whether it be water, soil or concrete. If the cavity is large enough, the only surface in contact with the medium will be the blunt tip of the nose.

Lockheed Martin hopes the supercavitating missile will reach 10 times the depth of the current air force record holder, the huge BLU-113 bunker buster, which can break through 7 metres of concrete or 30 metres of earth.

The BLU-113 needs a thick casing to withstand the friction, but a supercavitating bomb

suffers less resistance and so could have a thin casing, leaving more space for its explosive or incendiary payload.

But some experts are sceptical. "I am still not certain that the term 'cavitation' is correct for a solid," says Nathan Okun, a naval historian. And Robert Nelson of the Union of Concerned Scientists says, "I could believe a penetration factor increase of two but I don't believe a factor of ten."

Defence expert Michael Levi of Kings College London, UK, sees the need, however. "Increased penetration is more important for chemical and biological agent destroying weapons than other bunker busters because it's essential to get detonation inside the storage area."

Lockheed Martin will soon be putting an end to the speculation: four prototype weapons are due to be tested later this year.

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