



THE X-51

By Mark Lewis

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Some officials in the Defense Department want to answer concerns about the Tridents with more radical solutions: exotic, high-tech devices capable of outracing any machine in their class to catch fleeting foes. If these weapons work as planned -- and that's a big if -- they could let the Pentagon launch lightning-quick attacks without risking a worldwide nuclear storm.

On the coffee table in his cavernous office in the Pentagon's E Ring, Air Force chief scientist Mark J. Lewis has a model of such a machine, a 14-ft.-long missile called the X-51 WaveRider. With an angled nose, flaps in the middle, and an inlet on the underbelly, the device looks like a cross between a spaceship and a futuristic cruise missile. It's designed to go nearly seven times faster than a Tomahawk -- a flight from the Arabian Sea to eastern Afghanistan would take 20 minutes -- and destroy targets with its own kinetic energy. Test flights are scheduled for 2008.

The pressure, drag, and high temperatures associated with hypersonic speeds (typically, greater than Mach 5, or 3,600 mph) used to be considered too extreme for an aircraft to handle in a controlled way. Only ballistic missiles and spacecraft burning rocket fuel, shooting into space, and roaring back to Earth could go that fast.

What the X-51 does is to turn some of the most brutal effects of hypersonic flight to its advantage. Take shock waves, for example. Bursting through the air at a hypersonic rate produces a train of waves, one after the other, which can drag down an aircraft. But the X-51 is a "wave rider," with a sharp nose shaped to make the waves break at precisely the right angle. All of the pressure is directed beneath the missile, lifting it up. The shock waves also compress the air to help fuel the X-51's combustion process.

The craft is the same size and shape as a Joint Air-to-Surface Standoff Missile, so it can be attached to a B-52 or fighter jet. It runs on standard JP-7 jet fuel, not on rocket fuel, so it fits in neatly with the military's existing logistical chain. The X-51 is made from a fairly standard nickel alloy, not from exotic materials. And the advanced engine technology is very real. In 2004, NASA broke speed records while testing its X-43A, a precursor to the X-51 (see "Breakthrough Awards 2005," November 2005). In a final test flight, the 12-ft.-long aircraft hit 7,000 mph -- nearly Mach 10. In other words, the X-51 is not just some lab experiment; it's being designed from the start to deploy. "I've got tremendous confidence in it working," the Air Force's Mark J. Lewis says.

That doesn't mean the X-51 will be in competition with a conventional Trident. It will have a range of only 600 nautical miles. And it first needs to be lifted into the air by a plane, then accelerated by a rocket-fueled booster before its hypersonic engine kicks in. But if the 2008 test flight is a success, the X-51 will be the first weapon other than a ballistic missile to fly at hypersonic speeds.

NO CONFUSION

The Trident II iteration of Prompt Global Strike foresaw a push-button war, fought from the White House. It assumed that the United States would have few allies or bases abroad from which to attack. Local commanders would be largely circumvented.

But alternate scenarios being drawn up let U.S. forces act much as they do today, only faster. Hypersonic weapons could make that happen. Put an X-51-equipped plane in the air, and it could enable commanders to hit targets for hundreds of miles around in minutes. Tips could be acted on instantly; subs wouldn't have to be in a perfect position in order to strike. Intelligence wouldn't have to race all the way to the Oval Office. Wrong information would produce local damage. And because the X-51 wouldn't be confused with a nuke -- or have to fly



threateningly over nuclear-armed countries -- "you don't worry about starting World War III" when you score a direct hit, Lewis notes.

Hypersonic technology will take longer to develop than a conventional Trident. But the X-51, and weapons like it, might make the most sense for the Global Strike arsenal. After all, they reduce potential fallout from the riskiest part of the program: the human element.