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In the open ocean, a submarine can be stealthy – by using depth and maneuverability – to avoid air attack. But tactical options have become more limited in littoral operations that require operating in shallow water where evasion is difficult.

The new AIM-9X is an air-to-air missile, but with a special underwater shroud (in a combination called the Littoral Warfare Weapon), it can be carried in an unmodified configuration and fired from a submarine's vertical launch tube, says Michael Sharp, Raytheon's director of advanced maritime technology and a former submarine commander.

It provides a defense in situations "where running away from the threat doesn't work," Sharp says. "The submarine needs to be able to stand and fight," Sharp says. "That is a mission that the submarine force needs – to defend itself in areas where it can't maneuver."

More broadly, the U.S. Navy is looking at a wide variety of air-breathing systems that can be launched by submarines including UAVs with an assortment of payloads. While UAVs have been launched from the bridge and bottom of submarines, interest is focusing on the potential for more varied ways to launch UAVs – while moving and underwater – and in parallel with other sub-launched, littoral warfare weapons.

The genesis of the program rests in the reassessment of funding priorities over the last decade. Submarine force planners took a hard look at payloads and sensors that could see beyond the horizon as they contemplated the requirements for littoral warfare.

"The littoral warfare weapon concept [which kicked off about 2005] of launching not just missiles but unmanned air vehicles and any kind of air-breathing object out of a submarine tube started becoming a reality," Sharp says.

The intended mission for the AIM-9X is still somewhat broad. Sharp talks of attacking manned aircraft, but cruise missiles could become part of the target set. Anti-submarine platforms – whether fixed wing, helicopter or small, high-speed, surface ships – would be viable targets for the missile's infrared seeker. The U.S. Air Force also is looking at using AIM-9X for a combined air-to-air and anti-ship role.

If the risk reduction phase is successful, the sub-launched missile would become a program of record in 2012 with an initial operating capability in 2015-17, depending on the cost- and technology-driven pacing of the project.

Stage one was to prove the missile can lock on after launch, that it can arm itself after launch (and some distance away from the submarine) by an electronic arming system and that it can also attack surface ships.

Pictures of the first test show a short-burn rocket motor on an AIM-9X shape being launched out of the water at about a 30-degree angle from the horizontal. In combat, the low launch angle submarine tube orientation toward the approaching enemy also would shorten flight time to the target compared to a vertical launch.

Stage two involved introduction of the launch canister – dubbed the Stealthy Affordable Capsule System – which is being developed in partnership with Northrop Grumman, Sunnyvale, Sharp says. The missile will be integrated with

the capsule once they prove that a wooden shape can be launched safely without any risk of a misfire falling back on the ship. The missile rides on a rail inside the SACS with a gas generator fitted below the projectile and rail. Once the canister is out of the water and oriented in the direction of the target, both end caps blow off and the missile ignites and launches itself out of the tube, he says.

“The canister is designed to launch a variety of other vehicles such as UAVs or communications systems,” Sharp says. “The only limitation is that it fit into the [20-in. diameter, 14-ft.-long launch package]. That’s why risk reduction has been more about the capsule and submarine parameters than the missile. We’ve not had to modify the AIM-9X. The capsule protects it from the environment so you can use it off-the-shelf.”

The third and final stage of the risk-reduction program will focus on moving, underwater launches of capsule/missile shapes to ensure they stay on track underwater.