

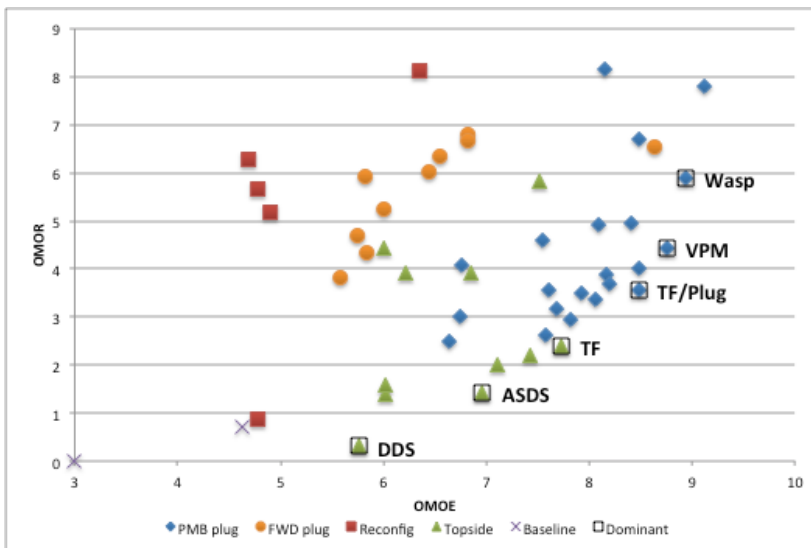
# VIRGINIA Block M - The sUUVerine Project

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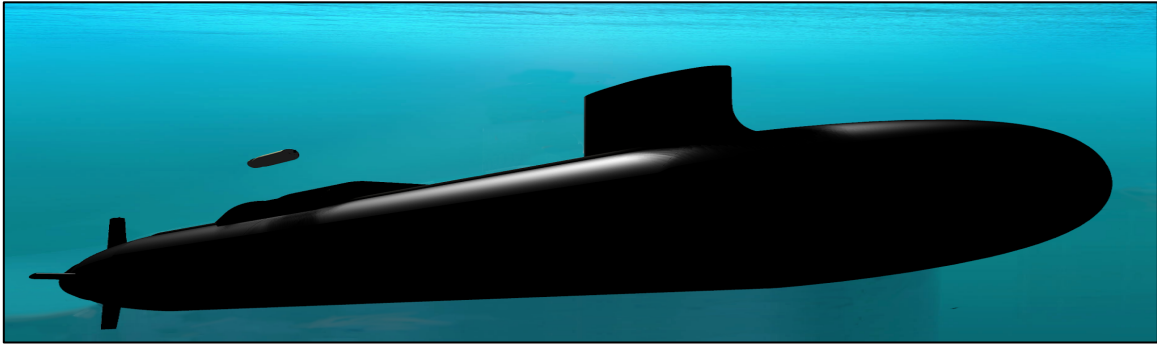
This study performed an analysis of alternatives to modify a VIRGINIA-like submarine to add unmanned vehicle (UxV) capability. Various designs were evaluated and ranked on risk, cost, and effectiveness in both UxV and typical submarine missions. One of the dominant designs was chosen for more detailed analysis. This option provides wet stowage of 4 Large UUVs underneath a topside fairing. The horizontal UUVs are launched and recovered through sliding doors at the top of the fairing. A 25 foot hull extension is added amidships to carry

UxV support systems, berthing, and meet reserve buoyancy requirements. The converted submarine demonstrates a flexible, balanced UxV capable design at a lower cost than the Virginia Payload Module (VPM); however, further hydrodynamic analysis is required. For a better return on investment, the study recommends a smaller conversion of just a Large UUV launch and recovery system that attaches directly topside. This should be pursued to gain operational experience with Large UUV employment. Submarine employment tactics for all UUV sizes must be matured in time to inform the next SSN design.



This study used an academic submarine model to evaluate the conversion of a VIRGINIA class submarine to a sea-based UxV host while understanding any baseline ship performance degradation. The conversion affords the host submarine the ability to transport, deploy, and recover various UxVs. The end result is a concept design, VIRGINIA Block M (VA-M), that achieves weight and volume balance while satisfying a set of requirements. The VA-M

concept gives insights to the most effective ways to increase the submarine force UxV technology. Additionally, it revealed key the technology advancements that required to make the design viable.



The figures depict perspective and body views of the VA-M concept design. The 25 foot parallel midbody plug with a streamlined topside fairing allows for the launch and retrieval of four wet-stored Large UUVs. Additionally, the conversion includes a new ocean interface in the plug for launch of man-portable UxVs. Although a 7 foot maximum height topside fairing produced significant hydrodynamic concerns, this variant provided a feasible and flexible UxV capability at a competitive risk and cost.

	VA-M	Baseline
LBP [ft]	402	377
L/D	11.8	11.1
Mean Draft [ft]	28.2	28.0
Submerged Displacement [LT]	8490	7800
Weight Margin [LT]	550	380
Reserve Buoyancy	12%	12%
Baseline speed decrement [kt]	-1	0
Cost of Construction (lead ship)	\$320 million	N/A

Principal Characteristics

