

## Forward Deployed VLS Reloading

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The US Navy has over 109 surface ships and submarines that employ vertical launch systems (VLS). The ability to reload VLS cells rapidly is vital to sustaining continuous forward deployed operations in a contested environment. The extensive infrastructure required to conduct safe and secure weapons transfer operations limits the number of ports around the world that can rearm combatants. This study evaluated the feasibility to fill the capability gap by refitting the 62,069 ton Bob Hope Class T-AKR with magazines and weapon transfer systems for mobile VLS reloading capability.

The T-AKR is a class of vehicle transport cargo ships capable of Roll-On-Roll-Off (RO/RO) and primarily used for prepositioning of Army vehicles. Its vast cargo capacity made it an ideal platform to carry a large payload of VLS supplies into theater. Additionally, its dual pedestal cranes offer a transfer capacity to load the missiles without external support.

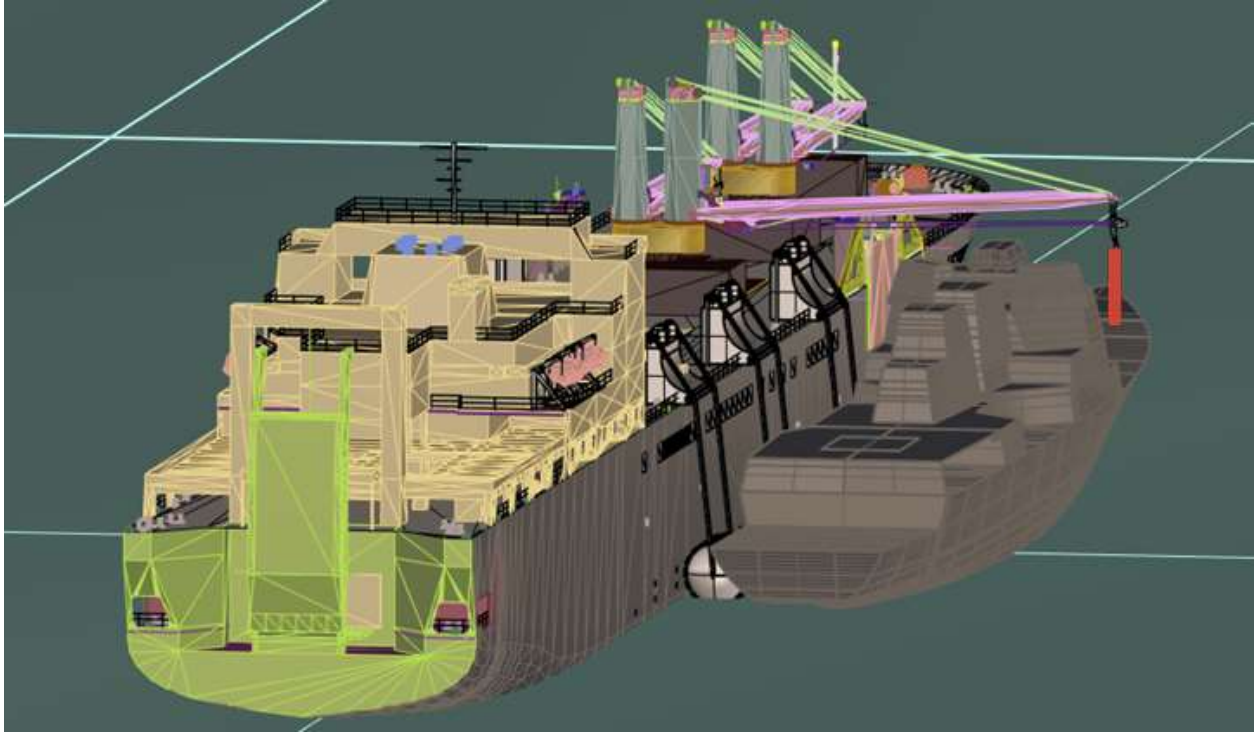
Our design philosophy focused on a delivering a long-term flexible and survivable solution for VLS transport and rearmament of the Surface Fleet. Due to the urgent need for this capability, the project team aimed to minimize the cost and complexity by leveraging existing cargo handling technology, minimizing the impact on the parent hull, and avoiding any modification of the current missile canisters.

Using the Pugh method we reduced the design space from 96 possible designs to three feasible variants and selected a final concept design that offered greatest magazine capacity and canister throughput for the lowest technical risk. Our design removed 328ft of deck from the T-AKR to convert 4 cargo compartments to 2 magazines with subsystems necessary to comply with US Navy explosive safety standards. The new weapons transfer system included overhead cranes and elevators to service both magazines and a rapidly deployable ship-to-ship (STS) fendering system necessary to conduct transfer operations in protected anchorages.

After modeling and analysis, this study concluded that the T-AKR had sufficient space, stability, seakeeping, and structural margin necessary for forward deployed VLS rearming. The preferred configuration achieved a maximum capacity of 428 canisters and is capable of simultaneously reloading 2 combatant VLS modules at a rate greater than 8 canisters per hour.



*Figure 5: T-AKR Elevator and Hold Concept*



*Figure 6: Reloading CONOPS Perspective*