

Executive Summary

The necessary recapitalization of US Navy service support vessels in the coming decades will likely face severe cost restrictions due to the constrained fiscal environment. One possible solution to mitigate the cost of many classes of a few ships is to design a common support vessel (CSV) to function as the design basis for different variants. The CSV envisioned in this study provides a concept design consisting of a basic hull form with an engineering plant and some common ship arrangements complete. This hull form is intended for vessels displacing 17,000 to 27,000 LT and has sufficient arrangeable area to support many variants in a final design process. Variants envisioned for the CSV include a submarine or destroyer/LCS tender, a command ship, a hospital ship, and a humanitarian assistance/disaster relief vessel. Economies of scale can be achieved in material procurement and production by using a common vessel as the basis for several variants. This concept enables the savings normally only realized during long production runs of a single class to be achieved over multiple classes.

Analyses of intact and damaged stability, seakeeping, and strength were conducted through the entire range of design displacements to ensure the CSV is suitable for serving as a parent to the individual variants. One of the key aspects of these analyses was to find a region of acceptable KGs. A plot of displacement versus limiting KGs then provided a region of safe and feasible designs. Ultimately, this led to a hull that is suitable for many variants without redesign, but is likely to be sub-optimal for most variants.

An analysis of requirements was conducted to determine areas of overlap between the proposed AS and LCC variants. For each of the design parameters the most limiting threshold value from the AS or LCC was set as the requirement for the CSV. From the areas of overlap, portions of the ship were identified that would remain constant for all ship variants. These portions include engineering spaces, tankage, and areas such as medical and dental facilities and administrative support functions.

A variant design of the next generation submarine tender, AS(X), was completed to test the utility of the CSV concept. The AS(X) carries forward the capability of the AS-39 class submarine tenders in performing IMA level work and weapon transfer. Improvements were made to ensure the AS(X) remains fully capable of supporting Virginia-class submarines through Block V. A focus of the design was to provide efficient flow of work pieces and repair parts between various spaces onboard the ship and to the submarine.

The successful design of the AS(X) utilizing the CSV demonstrates the feasibility of this concept. Cost estimates for the tender, found using a weight-based model, are \$820M for lead ship and \$650M follow ship (FY12 dollars). The true cost benefit for the CSV would be realized when the design is used across multiple variants. This would promote lower construction costs through learning curve gains and lower life cycle costs through use of common components.