

Integration and Implementation of Conceptual Design Tools for Naval Warships

by

John Harris Cathcart IV

Submitted to the Department of Mechanical Engineering
on May 10, 2023, in partial fulfillment of the
requirements for the degrees of
Naval Engineer
and
Masters of Science in Mechanical Engineering

Abstract

The Naval Construction and Engineering Program (2N) has relied on the Advanced Ship and Submarine Evaluation Tool (ASSET) as the primary tool for completing concept design projects for naval warships. ASSET is no longer supported by the U.S. Navy, and the Naval Concepts Requirements and Exploration (C&RE) tool has been identified as a feasible replacement. Incorporating the C&RE tool into the 2N program is part of new collaborative naval architecture research between Virginia Tech and MIT that is further supported by Naval leadership at NAVSEA, Naval Surface Warfare Center Carderock, Naval Surface Warfare Center Dahlgren, and others. The C&RE tool has been converted for further use in MIT's 2N program and is now available to all students for future warship design projects. Furthermore, a novel design tool is introduced that is capable of assisting naval architects to accurately and efficiently complete the preliminary arrangements of vital engineering and combat systems vital components. A case study for a new medium-sized surface combatant is conducted as a validation of both the C&RE tool for 2N use and the application of the preliminary arrangements tool.

Thesis Supervisor: Commander Douglas Jonart, USN, PhD
Title: Professor of the Practice