

# **Cooling System Early-Stage Design Tool For Naval Applications**

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This thesis utilizes concepts taken from the *NAVSEA Design Practices and Criteria Manual for Surface Ship Freshwater Systems* and other references to create a Cooling System Design Tool (CSDT). With the development of new radars and combat systems equipment on warships, comes the increased demand for the means to remove the heat generated by these power hungry systems. Whereas in the past, the relatively compact Chilled Water system could be tucked away where space was available, the higher demand for chilled water has resulted in a potentially exponential growth in size and weight of the components which make up this system; as a result, the design of the cooling systems must be considered earlier in the design process. The CSDT was developed to enable naval architects and engineers to better illustrate, early in the design process, the requirements and characteristics for the Chilled Water system components. Utilizing both Excel and Paramarine software, the CSDT rapidly creates a visual model of a Chilled Water system and conducts pump, damage, cost, weight, and volume analyses to assist in further development and design of the system.

Several case studies were run to show the accuracy (<12% error when compared against SWBS data), capability and flexibility of the tool, as well as how new electronic and mechanical systems can affect the parameters of the Chilled Water system.

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