

A Solution to the Inherent List on Nimitz Class Aircraft Carriers

by

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Abstract

Nimitz class aircraft carriers possess an inherent list to starboard that their list control systems (LCS) are typically unable to correct while under Combat Load Conditions. As a result, it has become necessary to use fresh water ballast in a number of inner bottom voids and damage control voids to augment the LCS. Maintaining liquid ballast in damage control voids is unacceptable, as it reduces the design counter flooding capability of the ship, and thus reduces ship survivability. In order to restore the ships operational flexibility and achieve the necessary/desired list correction, this study determines the effect of adding solid ballast to a series of voids/tanks identified on the 2nd, 4th, and 8th decks.

Based on ballast density, tank location and capacity, ease of ballast installation, minor tank structural modifications, and a decision making cost analysis, solid ballast was determined to be the most advantageous for use in correcting the inherent list on the Nimitz class aircraft carriers. Fresh water ballast was also examined as a possible alternative, but not as extensively due to the large quantity of water required and its limited ability to achieve a list correction.

Nimitz class aircraft carriers currently have an average list of 1.5 degrees and a KG of 47 feet. Since their allowable KG cannot exceed 48.5 feet, the average service life allowance (SLA) for KG is approximately 1.5 feet. This study shows that by adding approximately 400 lton of solid ballast, list can be corrected by 1.5 degrees with only a 0.1 percent increase in KG. Thus, to permanently fix the average Nimitz class aircraft carrier starboard list, there would be a 0.05 foot increase in KG, which in all cases is within the SLA. Additionally, this study shows that this 1.5 degree list correction can be accomplished at a low cost of approximately \$1,200 per lton. Considering the reduction in operational constraints and the benefits to ship survivability, this is truly an inexpensive proposition.

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