Development Of A Procedure for the Selection of Candidate Vessels Of Opportunity in Support of the Submarine Rescue Diving and Recompression System

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The US Navy's new system for rescuing stranded submariners, the Submarine Rescue Diving and Recompression System (SRDRS), utilizes a tethered, remotely operated Pressurized Rescue Module (PRM) deployed and controlled from a Vessel of Opportunity (VOO). The PRM is capable of docking with the disabled submarine at pressure and can rescuing up to 16 personnel per sortie. The PRM is launched and recovered using a deck mounted A-frame crane called the Launch and Recovery System (LARS). Upon recovery, the PRM docks with the Submarine Decompression System (SDS) to allow transfer and decompression of personnel. The PRM, LARS, SDS, and associated generators and auxiliaries all compose the Submarine Rescue System (SRS). The SRS, approximately 170 tons, is all installed aboard the VOO.

The SRS was nominally designed operation on the US Navy's Auxiliary Fleet Tug, T-ATF. However, the SRS is actually intended to be a fly-away system, capable of being installed on an available VOO near the disabled submarine. The VOO may be any Offshore Supply Vessel (OSV), Anchor Handling Tugs, or offshore barges that have the capacity to handle the SRS and are available in the area of a disabled submarine. Since the SRS must be rapidly deployed, potential VOOs must be quickly identified and evaluated for structural, stability and seakeeping suitability with respect to the requirements for the SRS.

This thesis describes the theoretical background and development of a procedure intended to aid in the analysis and evaluation of potential VOOs for stability and seakeeping suitability. This procedure is capable of utilizing limited information about the potential VOO such as length, beam, draft, depth, deck strength, dead weight tonnage, etc. as an input for rapidly modeling hull geometry. The developed hull geometry is then combined with an estimate for weight distribution and finally used as an input for stability and seakeeping analysis. Theoretical and empirical analysis is used to justify the requisite assumptions and estimates used in developing the VOO stability and seakeeping models. The efficacy of this VOO evaluation process is demonstrated with a sensitivity analysis and by using the T-ATF as a test case and comparing those results against known results.

With this process, the US Navy will be able to rapidly analyze and evaluate the stability and seakeeping characteristics of potential Vessels of Opportunity and judge their suitability to carry the Submarine Rescue System.