

Performance Analysis on Anchoring for 110' U.S. Coast Guard Patrol Boats

INTRODUCTION

At the heart of the surface fleet for the United States Coast Guard is the 110' Island Class Cutter (a cutter is defined as any power driven vessel greater than 65' in length employed by the U.S. Coast Guard). These vessels are utilized in many of the Coast Guards mission areas, such as Search and Rescue (SAR), drug/migrant interdiction, homeland defense, and Ports, Waterways, and Coastal Security (PWCS). Originally built in the late 1980s to early 1990s (there were 49 originally put into service, with 43 still in service), they have been continuously employed over the last 20 years in operations from the waters of the Caribbean, to the Northern Arabian Gulf, even as far as Guam. Often called the workhorses of the Coast Guard's fleet, they embark on patrols usually for five or six days at a time, with a crew of 16 (fourteen enlisted, and two officers, the Commanding Officer and the Executive Officer). During these patrols, it is not uncommon for the crew to be conducting operations for 16 to 18 hours a day, and during SAR cases, sometimes round the clock. When the opportunity arises during a patrol to take a couple hours off, often these Cutters will head close to shore and set their anchor. On more than one occasion, the anchors of these vessels have been damaged beyond repair, costing the individual Cutter to spend \$4,000 out of its operational budget to replace the anchor.

This analysis will determine why there are operational mishaps with conducting anchoring evolutions. Solutions will be recommended based upon the results of the analysis.

SOURCES OF ANALYSIS

In order to identify the reasons for Cutters damaging their anchors during anchoring evolutions, the first step was to contact five Commanding Officers (COs) or prior COs of 110' Cutters to survey them on their experiences with anchoring evolutions. Two of the five COs (40%) are currently holding the position, and three of them (60%) were previous COs on a 110' Cutter. Another step in the process was to gain information of the anchor itself, which is a 150 pound Danforth anchor. One of the COs had previously contacted the manufacturer to procure a replacement of his anchor, and had been told that the stainless steel Danforth anchor is only reliable for a 110' Cutter in the best of circumstances (little to no current, winds under 20 knots, clear bottom with no obstructions to foul the anchor). After gathering the subjects to interview, along with

information about the Danforth anchor, the next step was to conduct a gap analysis to identify the difference between the optimal and the actual.

GAP ANALYSIS

Optimally, the goal is for 110' Cutters to conduct their anchoring evolutions without damaging the anchor. While conducting the interviews with the COs, the following information was gathered to highlight the actual performance:

Participants	Frequency	Percent
Damaged anchor during actual anchoring evolution	1/5 YES	20%
Damaged anchor due to increase in weather/current	3/5 YES	60%
No damage to anchor during evolutions	1/5 YES	20%
Stainless steel anchor used during evolutions	4/5 YES	80%
Regular steel anchor used during evolutions	1/5 YES	20%

Based on the results from interviewing the 110' COs, a few interesting observations came to light. The first observation was that most damaged anchors were not the result of the actual anchoring evolution, but occurred while the Cutter was at anchor. For the COs that indicated that they had damaged their anchors due to weather or sea conditions, all indicated that the weather caused the anchor to start dragging (no longer holding the Cutter in place), and when the anchors were brought back up, they were found to be damaged beyond repair. Another interesting actual that came to light was that the type of anchor damaged in each evolution was the 150 pound Danforth **stainless steel** anchor. The one CO interviewed who had never damaged his anchor consistently used a steel anchor when his Cutter conducted anchoring evolutions.

ATTRIBUTING CAUSES AND SOLUTIONS

Commanding Officers are ultimately responsible for the safety of their Cutters as well as their crew, and have many hard decisions to make. In taking time off to get their crew rest, they must weigh the safety of conducting an anchoring evolution, especially when operating in an area where there are no designated anchorages. Also of the utmost importance to every CO is the uncertainty of the sea, that the weather can change in a

matter of minutes and create a dangerous situation, especially while at anchor, with the grounding of the Cutter a real possibility. However, there are steps that can be taken to minimize the possibility of damaging the Cutter's anchor. The most consistent answer as to why the stainless steel anchor was preferred over the regular steel one was that the stainless steel anchor will not rust, and therefore will not cause "running rust" out of the anchor pocket down the Cutter's hull, causing more maintenance for the crew (increased cleaning and painting of the hull). There was also a skills/knowledge deficiency in that the COs were unaware that the stainless steel anchor was not reliable in currents over one knot and/or winds at 30 or more knots. In addition, there was also an environmental barrier within the organization. In using the stainless steel anchors, the COs were ensuring that their Cutters outward appearance looked good, which in turn was noticed by their superiors. Another thing that every CO deals with is perception. A boat that looks freshly painted and is free of rust is perceived in the organization as a "squared away" boat, which means a "squared away" CO. This also falls into the incentive arena within the organization, as COs that are perceived to achieve more are given higher marks, which ultimately affect promotion within the organization.

ROLE FOR A JOB AID

There are significant factors involved in anchoring which highlight the need for a Job Aid. The Job Aid will not address the actual anchoring evolution, as every CO had a similar checklist on how to lower and set the anchor. Rather, the Job Aid will serve as a decision making assessment tool for while the Cutter is at anchor. The Job Aid will address weather parameters to closely examine to determine whether the Cutter should stay at anchor or get back underway. The Job Aid will include tools such as defining the Cutter's swing circle (the imaginary circle on which the Cutter can rotate 360 degrees around the anchor, used to make sure that the Cutter is clear of any obstacles) and the drag circle (an imaginary circle within the swing circle that will show the bridge watchstander whether the Cutter is dragging anchor). Also, the Job Aid will state to the CO to replace the stainless steel anchor with an alternate steel anchor when an upcoming anchoring evolution is planned.

This Job Aid, once complete, will be given to the Executive Officer of this analyzer's prior 110' Cutter to conduct a usability test on and hopefully send out to the other 110' Cutters in the fleet to use as a tool to mitigate the risk of causing damage to their anchors while conducting operations.