

# ***United States Navy Force Projection Improvement Project***

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**Abstract** — *An increase presence of US Navy ships is required in the Pacific Theater to maintain stability in the region. The increase of operating time at sea for the ships increases the time required for maintenance and repairs needed to keep them in the fight. Improvements of maintenance procedures and repair scheduling by emphasizing the “Critical Path” were proposed and discussed with both the Ship’s Force and Production Facilities in an attempt to perform more routine maintenance at sea by the Ship’s Force and streamline the maintenance that is performed while in port. The procedure and scheduling improvements had mixed results as around half of all proposed improvements were feasible in the time allotted and/or current personnel capabilities. Overall, the improvements that were possible will have a positive impact on the force projection presence in the Pacific theater by improving the areas maintenance facility, Ship Repair Facility, in Yokosuka, Japan.*

**Key Terms** — *Improvements, Maintenance, Procedures, Repair*

## **INTRODUCTION**

### **Motivation to study this topic**

On average US Navy surface ships are away from port an average of 50% of the time performing routine operations, training or emergent deployment due to a regional event that required deployment of US Navy forces. This requires that the ships be on an operational ready condition that allows them to be activated and sent out most of its operational life. Delays on maintenance availabilities in US shipyards are a major cause of delays to deploy vessels and decrease in operational readiness.

Recently the US Navy has determined that an increase presence for the 7th Fleet is necessary in the Pacific Theater. This is due to increase aggression and presence during recent years from regional nations that the United States considers adversaries. Examples of these are North Korea’s increase in testing of long-range missiles and nuclear weapons; China’s aggressive expansion into the sea region in between China and Japan, even going so far as to make man-made islands and constructing airfields in them; and Russia annexation of Crimea and increase military presence in the skies in Europe. To have an increase force projection in the area, more US Navy ships need to operate in the area or the current ships that are present need to be out at sea for longer periods of time. Increasing the number of ships available by construction would take too long, not to mention expensive. Bringing ships from other parts of the world would decrease the US presence in other points of interest. The only option would be to increase the amount the ships that are out at sea, which increases the amount of maintenance and repairs that are required to keep this ships operating.

### **Objectives or Thesis of this paper**

The increase requirements for maintenance and repairs for the 7<sup>th</sup> Fleet would mean that they need to spend more time in port to get repairs, which runs counter to the requirement to have more ships at sea. This will severely hamper the US Navy’s Force Projection initiative. The Navy maintenance force has to improve the way they do maintenance and repairs processes in the Ship Repair Facility at Yokosuka, Japan. To achieve this goal, they have to look at the way procedures are performed to try and improve them in a way that it takes less time with the same effect.

## **LITERATURE REVIEW**

The US Navy currently has approximately half the number of ships they had at the end of the Cold War. Even with this reduced number of warships, the US Navy is experiencing a backlog of repairs due to a deficiency of man-power at both the private and public shipyards and low number of drydocks available. With current plans to increase the numbers of ships in the fleet, this problem would be exacerbated. Compounding to this problem is the US Navy's tendency of deferring maintenance for a variety of reasons that then causes an increase workload on drydock maintenance periods that puts excessive strain on both public and private shipyard to try to accommodate the increase workload without having to mention the time delays [1]. The work also needs to comply with the Joint Fleet Maintenance manual as its baseline [2]. This manual has rules and regulations as to how to conduct maintenance and repair of Navy ships on both public and private shipyard.

The process improvements that are mentioned in this project would address gaps in the US Navy maintenance practices. Proper planning and proactive, not reactive, maintenance is the key to maintaining capability. Reactive maintenance (repairs) is normally the jobs that take priority on a normal workday, which is required but sometimes this is at the expense of preventive maintenance which will cause that component to fail at a later date causing a vicious cycle of deferring proactive work for reactive work that will cause even more reactive work [3]. This same mechanic also plays out for US Navy maintenance, shifting blame for problems is a common problem in the US fleet, which delays action on work and prevent action for determining the root cause for problems [4].

In conclusion, there is a dire need to improve the way maintenance is scheduled and performed, in addition to investing heavily in infrastructure for US Navy fleet maintenance before its gets to a point that critical missions cannot be performed due to disrepair.

## **ANALYSIS APPROACH**

### **Review of maintenance procedures**

The approach used in choosing the procedures for improvements was based on the impact that each procedure would make on the overall project [1]. The procedure had to be of enough consequence, either in difficulty or time required to actually make a difference in the overall time required to complete a maintenance and repair availability. Thou the focus was turned to procedures dealing with the ship's hull, engines and vital system as they are the most labor and time intensive jobs that are undertaken while in port. The use of more specialist training, preparation work by Ship's Force while at sea and breaking down the procedures in sections that can be accomplished separately would allow more flexibility on the way we performed them. The theory is that this would allow the procedures take less time with more involvements from Ship's Force.

### **Draft of new "Critical Path" Schedule**

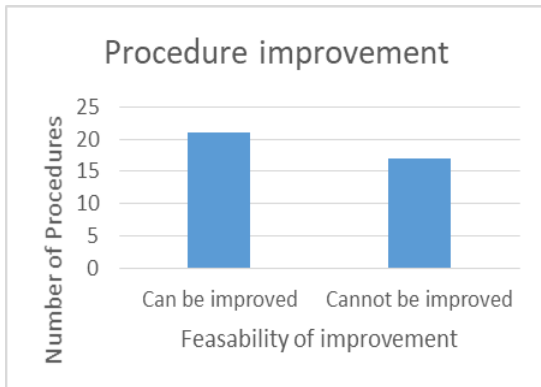
The "Critical Path" of a schedule is the minimal length of time required to complete the project. Analysis the amount of time a procedure needs to be completed, the data shows that a lot of time is spend in preparation work and restoration after the work is completed. With the cooperation of Ship's Force, preparation for work and close out of work can be performed by Ship's Force, which would cut on total time of Production personnel at the ships and total work time. Following this new perspective, SRF planners may begin using the improved "Critical Path" to plan work going forward.

## **RESULTS**

### **Improved Procedures**

In coordination with Ship's Force and SRF's Production and Planners, 22 procedures in total have been improved, as shown in Figure 1, involving maintenance of surface ship Gas Turbines used for propulsion and electricity

generation, inspection and repair of Hull structures and habitability systems [2]. Preparation work for this procedures normally takes a large portion of the time to complete this procedures. Most of the improvement was focused in this areas to cut the total time of the procedures and cutting the preparation time by either removing from the procedures completely, so it can be performed by Ship's Force or streamlining it or by streamlining the preparation in a way to cut the total time. This procedures will be used in the upcoming availability for the US Destroyer, USS John McCain, which was involved in a collision a few years back.



**Figure 1**  
Maintenance Procedures Reviewed

### Scheduling

The “Critical Path” schedule has seen improvements of around 10% of total length by adjusting the procedures that are considered in the critical path. The efforts were concerted between the production shops, Ship's Force, and shipyard planners that normally set the work schedule. The shorted procedures combined with the decreases requirements for preparation work that is not Ship's Force responsibility allowed the shipyard to streamline its efforts to more efficiently use its resources [3]. Some examples are the combination of various work items into one job and working two or more job sites at the same time due to the preparation work already been undertaken by Ship's Force.

## DISCUSSION

### Correlation of improve maintenance and military presence in the region

The projected improvement is 10-15%. If this can be directly applied to the readiness condition of the 7th Fleet, this improvement may be measured as days or weeks more at the sea for each ship. There are always other factors that can affect deployments, so this improvement will not have a full effect to improve deployments at the 10-15%, but would still make a difference in the long term. In addition, this is just a starting point on how to improve the way shipyards perform work and should continue to improve as more procedures are optimized and as more availabilities are completed and analyzed.

## CONCLUSIONS

### Results of maintenance and repair procedure improvements

During the course of the project, it was found that about half of the procedures that were intended to be improved would be too labor intensive to improve in the time available to complete the project. The other procedures selected were improved following the input of Ship's Force, Production team and SRF Planners. This means that the total results for the project as a whole were mixed. Ship's Force would require improve training that would need to be prepared and tested before it can be implanted. The training is intended to allow Ship's Force to take a bigger maintenance role by performing more maintenance “at sea” [4]. The positive results will have a major impact in the way maintenance availabilities will be monitored and controlled going forward. Using this project as a blueprint, other maintenance facilities for the US Navy can improve the way they perform maintenance to have an overall improvement in the US Navy fleet, not only on the 7th Fleet.

### **Future improvements**

As time constraints were an issue for this project, some of the procedures that were proposed could not be improved in the time allotted. Other constraints that could be overcome with more time are the increase of “at sea” maintenance procedures that could be performed by Ship’s Force with additional training and tooling.

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