

# The Signal

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The **Center for Naval Shipbuilding Technology (CNST)** is a Navy ManTech Center of Excellence, chartered by the Office of Naval Research (ONR) to develop advanced manufacturing technologies and deploy them in U.S. Shipyards. CNST's primary goal is to fund projects that drive shipyard improvements and ultimately reduce the cost and time to build and repair Navy ships.

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## Shipbuilding Technology Center Stays in Charleston

On August 24th of this year, we received some great news--ATI was selected by the Office of Naval Research's Manufacturing Technology Program to manage the Center for Naval Shipbuilding Technology (CNST), retaining this Navy ManTech Center of Excellence for at least two more years. CNST still has the same vital mission -- to select, award and execute projects that reduce the cost of building and repairing U.S. Navy ships. We will continue to team with US shipyards and other Navy ManTech Centers of Excellence to develop, deploy and implement innovative shipbuilding technologies and processes. We look forward to continuing the partnership with our partners to accomplish this and to build on the \$200M of acquisition cost savings projected from CNST projects to date.

Although acquisition cost remains our primary focus, we'll also be looking for ways to advance the Navy's efforts to reduce Total Ownership Costs associated with operating and maintaining the ships and submarines of the world's finest navy. The CNST team recognizes this demanding challenge and is excited about the opportunities ahead.

Best regards,

Kevin Carpentier  
Director



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March 9-10, 2010  
Beau Rivage Resort  
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# Outfitting Process Improvement

## **Outfitting Process Improvements Reduce Man-hours by 30%**

The Center for Naval Shipbuilding Technology recently completed a project that analyzed the major processes employed during the outfitting stage of construction, then identified and prioritized opportunities for improvement and evaluated improvement options. The *Outfitting Process Improvement* project was a two year effort led by General Dynamics Electric Boat (GDEB) and has proven to be a great success. To date, the project has achieved cost savings of \$1.8M per hull and once fully implemented, is forecasted to save about \$5M per hull.

In addition to analyzing and improving current processes, this project also investigated the latest in equipment and information technologies to determine if their implementation could significantly reduce the costs and span times for final shipboard installation and outfitting. The project was completed in two phases. The first phase analyzed and documented the cost impact for each of the major processes involved in outfitting. Phase II then developed and implemented process improvement plans in areas such as planning, scheduling, and overall work management. The VIRGINIA-Class Submarine (VCS) Program will directly benefit from the process/tool improvements resulting from this effort. At the conclusion of the project, there were 10 initiatives that were fully implemented, another 22 initiatives in process and 7 more potential, future initiatives. Some specific benefits of this ManTech project include, but are not limited to: increased presence of foremen in outfitting work cells; increased number of outfitting activities while cylinder/section is in vertical position; earlier layout work for attachments, inserts, cut-outs, and tank marginal plates; reduced amount of manufacturing activities happening in outfitting work cell; and increased efficiency in hand-offs of material, information, and work within and among crews.



## VCS Material Management

### **Project Gives Planners Complete Scheduling Picture**

The CNST/General Dynamics Electric Boat's (GDEB) VIRGINIA-Class Submarine (VCS) *Material Management* project is now complete and has already yielded cost savings of \$3.1M with plenty more to come. Ultimately, this project is expected to save over \$5.4M per hull, \$4M in labor, and \$1.4M in material savings, adding to the growing list of successful GDEB affordability initiatives sponsored by ONR and managed by CNST.

This project began in June 2007 with an overarching objective to implement a world-class material flow system that supports the VCS construction program. Shipyard material flow management challenges directly contribute to higher cycle times, excess inventory, low material availability rates, and re-manufacture/re-procurement costs due to rejected, damaged or lost parts. This project set out to evaluate the performance of the material flow process from requirement identification to material delivery to the trades.

To begin, the GDEB team worked with ManTech's Institute for Manufacturing and Sustainment Technologies (iMAST) to develop a current state value stream map. iMAST performed computer simulation modeling, then the GDEB team identified best-in-class companies and benchmarked their material management systems to identify process excellence in material flow techniques. This resulted in a prioritized list of projects and led to a formal Improvement Plan. After modeling the Material Management System at GDEB's Quonset Point facility, the team was able to analyze potential improvement scenarios prior to implementation. A gap analysis identified the necessary steps to bring the current state to the ideal state, based on targeting key material management areas that reduced non-value added activities.

Implementation of these optimized material management systems at GDEB began in January 2008 and is already improving multiple facets of the VCS construction operation, including material procurement, scheduling, storage, handling, tracking, and delivery. In total, 36 projects were completed, have been fully implemented, and are supporting in-process shipbuilding with cost savings realized in the build sequence for the USS NORTH DAKOTA (SSN-784). These multiple successes are helping to bring the VCS program one step closer to the 60-month construction schedule targeted for these submarines, a significant reduction from the previous 84-month construction span. Findings from this effort are not limited to submarine construction, but can be implemented across a variety of industries.



# Pipe Shop Process Re-Engineering

## *Streamlining Processes and Reducing Span Times*

In May 2009, The Center for Naval Shipbuilding Technology (CNST) awarded General Dynamics Electric Boat (GDEB) this two-year project to re-vitalize their pipe manufacturing processes and improve pipe fabricating sequence practices. This project is focusing on integrating technology for bending, assembling, and welding all piping systems associated with VIRGINIA-Class Submarine (VCS) construction.

In order to streamline the pipe assembly process, the GDEB team is identifying and grouping similar pipe details along with the specific processes used to assemble those details. An example of differentiating factors include, but are not limited to: large diameter pipe versus small diameter, pipe with socket welded fittings versus butt welded pipe, and different material types. By identifying product families, the team will be able to develop process lanes that restructure the flow of pipe details through the shop. Special consideration will be aimed at increasing automated welding, resulting in better quality welds that can be completed in significantly less time. It is the goal of the project team to automate 80% of all pipe welds, using both the horizontal rolled process and orbital welding process.



The overall objective is to drastically reduce the span time required to build pipe details and assemblies. Phase I is scheduled to run through April 2010, and will concentrate on mapping out the current “as-is” process and developing the “future state” process map with all of the opportunities identified, the development of part families, and process lanes. Phase II will concentrate on the technology insertion possibilities to address the problems identified in Phase I. It is estimated that this project will result in an estimated three man-hour savings for each unique pipe detail fabrication in the GDEB pipe shop, resulting in a cost savings of approximately \$2.7M per VCS hull.

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## Small Weldments Optimized Cell

### *Project Completed at Northrop Grumman's Newport News Shipyard*

The project team from Northrop Grumman Shipbuilding – Newport News (NGSB-NN) completed a 22-month effort aimed at reducing the time and associated cost of fitting and welding small components for the VIRGINIA-Class Submarine (VCS). The NGSB-NN Project Team projects cost savings of over \$450K per VCS hull, with potential to grow significantly as other production areas assess the project's findings.

At NGSB-NN a small component or “small weldment” is any structural part that is manufactured or assembled in the small component fabrication and assembly shops. These parts can be up to 4' x 8' in size and weigh up to 5 tons. With over 1,800 small weldments assembled per VCS, the task of reducing the touch labor associated with these components presented challenges but also potentially large rewards. By developing and running computer simulations of the flow of these components through the shop, the project team identified several areas for improvement, both in the layout of the flow process and also with the configuration and type of equipment needed to quickly fabricate items of this size. Focusing on improvements of material handling tooling, such as improved fixturing, the team confidently predicted a 20% reduction in touch labor. This prediction showed to be conservative – validation of the ideal state showed as much as 28% in reduced man hours to fabricate these assemblies, a potential savings of \$450K per VCS hull. Also, the word has spread and other shops in the yard are very interested in the results of these improvements to the Small Weldments fabrication shop. The CVN program at NGSB-NN could save as much as \$1.2M per hull if similar measures are implemented in its comparable workshops.

Of course cost savings are only realized if the technology is implemented; NGSB-NN gave a clear indication of their intent to implement the project's results in September of 2009, when the VCS Small Weldments shop submitted a formal Capital Expenditure (CAPEX) request to the NGSB-NN VCS program office for almost \$600K in new equipment and upgrades to work cells. One example is a smaller, more capable modular fit and weld table, with an integrated fixturing kit for flexible positioning of material to the best access (safe and ergonomic). Material movement practices were also studied and a more intelligent lifting device was identified that enables positioning of small components without occupying the building's larger gantry crane. This CAPEX request represents NGSB-NN's commitment to reducing acquisition costs, as it provides a favorable business case and return on investment to be considered for approval.

