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REDUCING THE COST AND TIME TO BUILD **NAVY** SHIPS

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Virginia-class attack submarine Pre-Commissioning Unit (PCU) Minnesota (SSN 783)
Photo courtesy of U.S. Navy

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guided-missile destroyer USS Arleigh Burke (DDG 51)
Photos courtesy U.S. Navy

Concept Tool Design
Photo courtesy of Electric Boat Quonset Point

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Lead liner adhesion process (old vs new)
Photos courtesy of General Dynamic Electric Boat

"Smart Welder" System
Photo courtesy of General Dynamic Electric Boat

Portable and fixed data collection devices
Photos courtesy of Huntington Ingalls – Ingalls Shipbuilding

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FMMS & DMC 2014 Announcements.
Photos courtesy of FMMS 2014 and DMC 2014

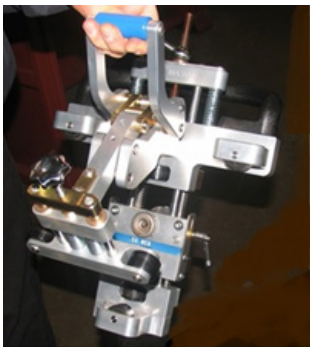
Ingalls Shipbuilding Looks to Reduce DDG 51 Construction Costs Associated with Shaft Alignment and Flame Straightening

Huntington Ingalls Industries-Ingalls Shipbuilding is executing two Center for Naval Shipbuilding Technology (CNST) -managed projects, each targeting a labor-intensive production activity: shaft alignment and structural fairing, also known as flame straightening. Both projects were awarded as 'Mega Rapid Response' efforts, as traditional project award processes and ship construction schedules could delay the project's start, potentially missing a cost savings opportunity.

The objective of the DDG 113 Shaft Alignment Using `ON TRAK` Laser Metrology Instruments project is to significantly reduce the labor required to install the waterborne components of the propulsion shafting system by pre-machining the stern tube and strut castings in the machine shop prior to installation on the ship. The approach to mitigate tolerance concerns is to leverage the "ON TRAK" metrology system that can determine the center of a diffused laser beam within very tight tolerances over the full length of the propulsion shaft. This accuracy helps compensate for the movement of the ship during the installation measurement activity. Once the shaft components are positioned, the location can be monitored accurately in real time during welding. This change in process will enable technicians to accurately monitor the impact of the welding process on the struts and stern tubes in real time. This technology, once implemented, could potentially save an estimated $235K per DDG 51 Hull, resulting from reductions in manufacturing services labor, machining labor, and paint labor.

The objective of the Structural Fairing Process Improvement project is to investigate the current procedures used to straighten deck plate, gain an understanding of the limits to which distortion can be safely brought into tolerance without compromising material strength, and revise the guidance procedures used by fairing tradesmen. The goal is to revise current flame straightening patterns and determine the most effective pattern for various steel grades and thicknesses that applies the lowest amount of heat into the plates to achieve the flatness requirements. The revised patterns will be included in handbooks, which will be distributed to the straighteners and supervisors, and will also include application methods and instruction on temp stick readings, limits, and the process steps where fairness checks will be required. The improved process, once implemented, could potentially save an estimated $776K per DDG 51 Hull, resulting from reductions in hull rework, flame straightening labor, compartment completion labor, and coating rework.

GDEB Completes Outfitting-focused Project; Early Implementation Saves over $460K per VIRGINIA Class Submarine, With More Savings to Follow



The Office of Naval Research VIRGINIA Class Submarine (VCS)-focused VCS Outfitting Tools and Processes project, managed by the Center for Naval Shipbuilding Technology (CNST-a Navy ManTech Center of Excellence), focused on identifying opportunities to minimize the labor associated with Outfitting support processes. Outfitting the VCS is complex, involving the installation of thousands of parts into tight spaces by highly skilled tradesmen. Frequently these trades are dependent upon specialized equipment and internal support service organizations (Quality, Rigging, Test) to accomplish a task. The timeliness of the support these organizations provide to the Outfitting trades is critical to their meeting cost and schedule objectives. General Dynamics -Electric Boat (GDEB) identified that improving the alignment of the Support Organizations' goals and objectives with the Outfitting Department presented a major opportunity for cost reduction, as these disciplines have a direct impact on the trades' ability to perform value added operations by limiting trade access to the unit, providing necessary documentation and verifying quality evidence necessary for work to proceed.

This project began in December 2012 and was executed in two phases. The first phase included requirement identification, present process identification & mapping, market study efforts, future state determination, resulting gap analysis, solution determination and prototype down-select. Phase II of the project focused on execution of the process improvement pilot plans. The GDEB project team identified alternative methods and equipment, evaluated the prototypes and created a detailed implementation plan based upon the results of the pilots. GDEB successfully completed in August 2014, with the early implementation activities already saving $460K per VCS hull. Once all planned improvements are fully implemented, GDEB expects to save an estimated $730K per VCS Hull by minimizing interruptions to the Outfitting construction process.

Lead Installation Process Improvements Saves $330K per VCS Hull

Lead installation processes had not changed in decades, resulting in higher non-recoverable cost expenditures through lead material waste, energy consumption, equipment wear and other costs. The Lead Installation Process Improvement project was tasked to identify, review and select processes to improve current lead installation procedures. General Dynamic Electric Boat (GDEB) investigated three targeted lead installation areas to determine if more efficient processes exist including improved safety. The GDEB project team's goal was to improve lead installation efficiency and reduce man hours by 3,000 hours and minimize or eliminate hazardous work procedures for lead shielding installation, with an initial cost savings goal of $277K per VIRGINIA Class Submarine (VCS) hull.

Apply Adhesive
Hazardous Materials – Messy

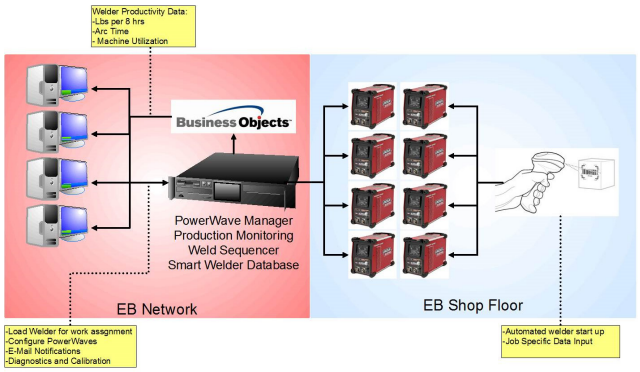
Vendor supplied adhesive backed rubber
"Peel and Stick"

The EB team recognized the need to move quickly, realizing incremental implementations as the project progressed. GDEB investigated three areas, 'lead caulking,' 'lead handling' and 'lead bin outfitting,' to determine if more efficient processes existed to provide increased worker safety. Investigation of alternative methods resulted in early success, with the design and manufacture of a lead handling fixture that greatly reduced the risks associated with this critical task.

The GDEB team identified and implemented many process changes, exceeding the lead installation cost reduction goal and improved employee safety. GDEB has eliminated 4,000 man hours from the VCS build time, a cost savings of $330K/hull, 20% more than originally estimated. In addition, this project had significant benefits to other organizations, to include the OHIO Replacement team. The lessons learned and improvements made as a result of this project were transitioned to Newport News Shipbuilding, the Moored Training Ship conversion and the OHIO Replacement (OR) design-build team, where the OR Program has estimated a cost avoidance of over 2,500 hours per OR hull based on the findings from this Lead Installation Process Improvement project.

Completed Welder Productivity Project Expects to Save $2.5M per Hull

The objective of the project was to drastically reduce the time required to initiate the daily welding processes at General Dynamics Electric Boat (GDEB), and mitigate the potential of Wrong Weld Wire violations, with an initial cost savings goal of $1.2M per VCS hull. Several factors affected the welder productivity at the beginning of each shift, as shipyard welders had to complete various startup tasks before the first welding arc was struck, such as verifying work assignment, ensuring the correct materials are on hand and verifying welder qualifications. These necessary tasks are time consuming and limit actual "arc time", reducing the welders' per-shift productivity. Strict regulations are placed on a welder prior to actually performing a weld to ensure compliance with all weld specifications and failing to fully comply with those specifications can result in costly rework.



The GDEB team studied the welder startup operations and created a detailed flow diagram of all the tasks that a welder performs from the time they start their work shift until they begin welding. The Lincoln Electric Company, assisted in developing the capability to electronically verify the welder startup checklist. The Pennsylvania State University Applied Research Laboratory developed a prototype system to take information from these EB's legacy systems and populate the Lincoln Electric commercial system. The integration efforts led to the 'Smart Welder' system, now in commercial development.

GDEB piloted a "Smart Welder" System concept which created electronic checkpoints in the welding machine to be met before welder can begin welding, reducing the start-up wait times. GDEB prototyped the Production Monitoring software to monitor and record specific welding information that provides real-time, efficiency-focused welding attributes, essentially providing on-the-spot welder feedback. The team also developed and implemented a mechanized welder prototype that paired novice welders with experienced mechanized welding tradesmen to improve weld quality and optimize welder work assignments. The team implemented these and other process improvements across all welding production levels, reducing pre-work start-up delays for over 400 welders and also installed efficient welder production support equipment. These efforts have reduced welder startup times by 50%, generated a 20% productivity improvement, and eliminated 65% of wrong weld wire occurrences per year. As a result, the GDEB project team now anticipates saving over $2.5M per VCS hull once fully implemented in 2015, doubling the original estimate.

Ingalls' Continues Executing Digital Strategy: Completes 'Mobile Supervisor' Project

Huntington Ingalls Incorporated (Ingalls) has completed the DDG 51-focused Development of Technical Requirements for Mobile Supervisor project. Supervisors and Foremen are required to leave the ship and find an office to perform necessary administrative activities. Introducing mobile applications to "put the task of data capture and entry at the point of activity" increases time spent on the deck-plate, reduces the time required to perform administrative duties, and enables just –in-time completion of other administrative responsibilities such as material location, compartment completion, and supervision of bill closures.

The 'Mobile Supervisor' project focused on and piloted three system functions: Mobile Timekeeping, Material Inspection, and Paperless Records & Maintenance for operations. The project team provided shipyard foremen with mobile technology and applications to put the many tasks of data capture and entry at the point of activity, keeping foremen on the production floor, The project's technology has decrease the time away from the production environment, ultimately providing greater work coverage. The handheld devices utilizes the mobile applications for time keeping, recording training participation, and verification of material receipt, and expects to show about a 10 percent efficiency increase. This increased productivity correlates to a potential savings of $2.8M per DDG 51 hull.

CNST

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