

# Lead Installation Process Improvement

Status: Implemented

## PROBLEM / OBJECTIVE

At the beginning of this effort, lead installation work accounted for approximately 27,000 man-hours consumed for each VIRGINIA Class Submarine (VCS) hull. Installation processes had not changed in decades and this had resulted in non-recoverable expenditures through lead material waste, energy consumption, equipment wear, and other costs. The VCS program established a goal of reducing lead installation labor hours by 15% and reducing lost work time. The overall objective of Lead Installation Process Improvement project was to identify, review and select processes to improve current lead installation procedures. The project goals were to reduce man hours, improve lead installation efficiency, and minimize or eliminate hazardous work procedures for lead installation.

## ACCOMPLISHMENTS / PAYOFF

### Process Improvement:

General Dynamics Electric Boat (GDEB) executed this two-phase project with incremental implementations as the project progressed. Phase I efforts focused on the development of a current state map, the investigation of alternative methods and equipment/material that support the VIRGINIA contractual requirements, and the development of a desired future state map. Investigation of alternative methods resulted in early success with the design and manufacture of a lead handling fixture that greatly reduced risk for injury and crane accident. This initiative was recognized as the GDEB 2012 2nd Quarter Safety Process Improvement Award winner at the Quonset Point Facility. Examination of process steps resulted in a transition from applying caustic caulking to installing adhesive backed rubber liner in lead bins. This has significantly reduced man-hours and avoids interruptions of the other trades.

Phase II conducted prototype evaluations and created an implementation plan with validated business case. GDEB investigated three areas, Lead Caulking; Lead Handling; and Lead Bin Outfitting, to determine if more efficient processes existed to provide increased worker safety. EB has successfully implemented the use of lift tables to support delivery of lead bricks to external bins and have established a lead staging area with designated lead installation support tradesmen for vertical modules. This approach led to another GD Quarterly Safety Award submission. The team developed training videos for lead caulking process which will be used by Safety and Training. EB created a process that transitioned the cutting and painting of 600 lead sections back to the vendor, reducing excessive material handling and material waste. EB has shared technical successes with and provided



input to OHIO Replacement Program (OR) design-build teams.

### Implementation and Technology Transfer:

Electric Boat has identified alternative methods and equipment, evaluated the prototypes from the down selection of options, created a detailed implementation plan for the selected methods, and provided a GDEB-approved training curriculum for lead installers. Phase II culminated with an Implementation Plan for effective methodologies and provided an updated estimate of expected project benefit based on pilot implementation and already implemented practices. Several of the results have already been transitioned to the VIRGINIA Class Submarine Program at the General Dynamics Electric Boat facility.

### Expected Benefits and Warfighter Impact:

- Reduced man hours (4,000 hrs/hull)
- Improved lead installation efficiency
- Minimized/eliminated hazardous work procedures for lead shielding installation
- Estimated cost savings: \$330K/hull (20% more than originally estimated)
- OR Program Cost Avoidance estimates:
  - 2,500 hrs/hull
  - \$19,000 material savings
- New lead bin lining process used by NNS and NNSY

## TIME LINE / MILESTONES

Start Date: April 2012  
End Date: April 2014

## FUNDING

Navy ManTech Investment: \$490K

## PARTICIPANTS

Virginia Program Office  
General Dynamics Electric Boat  
Center for Naval Shipbuilding Technology