

# VCS Improved Cable Lay and Sequencing Tool

Status: Implemented

## PROBLEM / OBJECTIVE

The VIRGINIA Class (VCS) and COLUMBIA Class (CLB) Submarine Programs' operation and planning personnel involved with the installation of cables identified an opportunity for significant and recurring savings. There are 15,000 to 20,000 cables on a nuclear submarine. The process of designing, planning and installing each one of these cables is complex and exacting. It consisted of a designer manually modeling tubes from the start of the route through each hanger to the termination. Cable sequences were also rife with inefficiencies: work orders tended to be by area but cables could span the entire ship. The result was that large amounts of cable were ordered and warehoused only to sit idly coiled until the next module was ready. The process proceeded in phases: logical design, component physical design, cableway design, cable routing, cable lay, and cable sequencing. This project addressed the last two steps in the process.

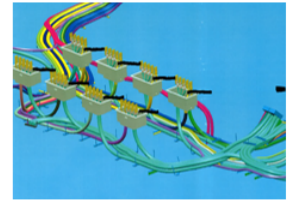
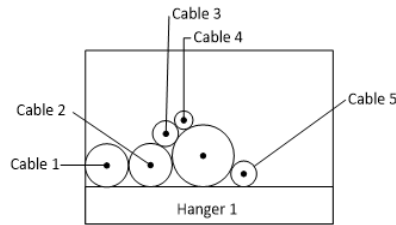
The VCS Improved Cable Lay and Sequencing Tool project was focused on re-engineering the cable lay and sequencing processes. The re-engineered processes assist the planner in the selection of smaller work packages. This results in savings in material ordering, warehousing of cable, reduction of clutter in outfitting areas and more timely installation of cables in modules and on board the ship.

## ACCOMPLISHMENTS / PAYOFF

### Process Improvement:

Electric Boat Corporation (EB) believes the 'Improved Cable Lay and Sequencing Tool' provides the best method for reducing costs for cable lay and cable sequencing by first re-engineering the processes. The re-engineered processes take advantage of new tool capabilities that became available at EB. The cable lay tool takes advantage of new capabilities in EB's cable routing application which supports the efficient design of select cable lay models. The user is able to specify location on the cross section of the cableway hangers for a given cable and the system generates the cable lay model. This model is used to publish graphical and tabular manufacturing aids for use by operations personnel.

The Cable Lay and Sequencing Tool allows electrical designers to create a 3D CAD model of designated cable lay for a cable across its route. This includes the verification that designated Electro-Magnetic Interference (EMI) rules have not been violated. Second, the tool provides the capability to sequence cable installation based



Picture Courtesy of Electric Boat

on status of the ship. It typically begins in the early stage of design where functionally related equipment, systems, tanks, etc. are located to reduce the distributed system footage and maximize standardization potential.

### Implementation and Technology Transfer:

The 28-month project was executed with two sequential sets of tasks. The first set of tasks addressed the process re-engineering, requirements analysis and prototype of the new cable lay process and tool. The second set of tasks addressed the process re-engineering, requirements analysis and prototype of the new cable sequencing process and tool. EB now has a cable lay and sequencing tool that assists the planner in the selection of smaller work packages. This results in savings in material ordering, warehousing of cable, reduction of clutter in outfitting areas and more timely installation of cables in modules and on board the ship. Once fully implemented, EB thinks the combined improvements created by the improved tool translate into a potential savings of \$2.7M per OR hull and \$274K per VCS hull.

### Expected Benefits and Warfighter Impact:

The Cable Lay and Sequencing Tool will reduce cable lay design and cable sequencing cost for planning and operations on both VCS and OR platforms.

- 10% reduction in OR cable lay design cost
- 10% reduction in OR cable sequencing cost
- VCS Savings equal to 10% of OR savings for cable lay and cable sequencing

## TIME LINE / MILESTONES

Start Date: December 2015  
End Date: May 2017

## FUNDING

Current Navy ManTech Investment: \$639K

## PARTICIPANTS

Virginia Program Office  
Ohio Replacement Program Office  
General Dynamics Electric Boat  
Naval Shipbuilding and Advanced Manufacturing Center