

Sequencing & Scheduling

Improving the Outfitting Process

In June 2009, The Center for Naval Shipbuilding Technology (CNST) awarded General Dynamics Electric Boat (EB) a 24-month project, *Sequencing & Scheduling*, to develop an advanced visualization system to improve the sequencing and scheduling aspects of the outfitting process. This application will provide the ability to visualize the assembly and disassembly of submarine components internal to the hull.

The current VIRGINA-Class Submarine (VCS) build strategy requires significant review and analysis

to ensure the most effective location economy has been achieved in light of recent improvements in manufacturing processes and information technology. There is a pressing need for improved production engineering tools to enable better planning and sequencing of the various tasks and trades involved in outfitting a VCS hull. In an effort to reduce man-hours and costs incurred in the outfitting process, this project will focus on re-evaluating EB's current practices, developing new processes and introducing manufacturing concepts that will transform the outfitting activity into a world-class packaging and outfitting shop.

The scope of this project will include the manufacturing and outfitting processes associated with completing major units. A cross-functional approach will be taken to ensure that all barriers are identified that prevent achieving significant cost reductions and significantly increasing throughput rates. The project will determine an optimal sequence for which a given assembly should be built in the outfitting phase, thereby minimizing cycle time.

The ultimate objective of this effort is to analyze quickly and easily where work is being accomplished and ensure that it is being done in the correct sequence and as early as possible in the manufacturing and outfitting schedule. One of the highest priorities of this task is to move highly congested, time-consuming work done inside the hull to the manufacturing cells, increasing the economic benefits of minimizing on-ship production work and maximizing shop work. EB estimates this project could yield a costs savings of \$1.5M per VCS hull.

About CNST

CNST is a Navy ManTech Center of Excellence, chartered by the Office of Naval Research (ONR) to identify, develop and deploy, in U.S. shipyards, advanced manufacturing technologies that will reduce the cost and time to build and repair Navy ships. For additional information on this and other CNST projects, please visit www.cnst.us.



VCS Cylinder Outfitting During Construction at Electric Boat