



The CNST Signal

A Publication of the Center for Naval Shipbuilding Technology

Winter 2005

Wireless Diagnostic Projected to Save Millions in Costs

The Center for Naval Shipbuilding Technology (CNST) has awarded a \$435,000 wireless technology project to Northrop Grumman Newport News. The Newport News-led team includes Northrop Grumman Ship Systems Ingalls Operations and RLW, Inc. The project is developing wireless automated diagnostic and prognostic equipment for monitoring shipyard facility diesel engines, and has the potential to save the shipbuilding industry tens of millions of dollars in repair and maintenance costs. The 15-month project formally began with a kickoff meeting in October 2004. In addition to the team members and CNST representatives attending, National Shipbuilding Research Program wireless project technical representatives participated and briefed the status and applications of a separately developed wireless monitoring system, providing a unique opportunity to leverage existing technological advances for the wireless automated diagnostic and prognostic application.

uses existing wireless technology to locally monitor and evaluate the condition of mobile, high-value shipbuilding equipment such as cranes, transporters, tugboats and locomotives. Significant costs are associated with failures of these equipment types and at present, only a small amount of diagnostics and prognostics are performed. The operating maintenance industry standard thumbrule for cost-to-repair is 15:1, where it costs 15 times the amount to repair after complete failure than to conduct the repair at first indication of equipment malfunction. An increase in the level



Existing wireless technology will be used to locally monitor and evaluate the condition of high value equipment.

The primary goal of the project is to develop a system that

continued on page 3

CNST Kicks Off Seven New Projects to Benefit Navy Programs

The Center for Naval Shipbuilding Technology (CNST) has recently received approval from the Office of Naval Research (ONR) to award seven new projects worth approximately \$3.2 million. The selected projects address many U.S. shipbuilding and ship repair processes, each intended to increase the efficiency and reduce the costs of manufacturing and maintaining U.S. Navy vessels. These projects have the potential to impact all shipbuilding programs, but in the short term are specifically focused on the VIRGINIA Class Submarine, CVN-21, LHD-8, LPD-17, DDG-51 and T-AKE programs. Counting these seven projects, CNST now has 11 projects underway that cover many U.S. shipyard design, fabrication, assembly and quality assurance processes.

The first of the seven projects awarded will work to develop a system for improving weld inspection procedures in the shipyard environment by developing a new portable weld inspection management system. This system will integrate commercially available equipment components, customize tools for shipyard inspection needs and develop reporting tools. Bath Iron Works is the project lead and has teamed with Edison Welding Institute and Servo-Robot, Inc. on this 21 month, \$369,000 effort.



The portable weld inspection management system will customize tools for shipyard needs.



The second project is a hybrid laser/gas metal arc pipe welding system development effort, led by Penn State's Applied Research Laboratory and supported by the National Steel and Shipbuilding Company. This 24-month, \$1.3 million effort is working to develop a laser/gas metal arc hybrid system capable of performing full penetration, radiographic-quality welds in one or two

continued on page 3

This Issue

Letter from the Director.....2

Project Summaries.....4

Upcoming Events.....2



CNST Organization

Director:

Ron Glover, ATI

Technical Director:

Bob Schaffran, Schaffran Inc.

Business Manager:

Larry Karns, ATI

Director of Contracting:

Natalie Corella, ATI

Management Assistant:

Marcia Lytton, ATI

Program Officer:

John Carney, ONR

CNST Solution Identification Team

Ron Glover

CNST Director

Bob Schaffran

CNST Technical Director

Larry Karns

CNST Business Manager

Henry Watson

VP Applied Research and Development, South Carolina Research Authority

John Craggs

Managing Director, First Marine International

Dr. Richard Storch

Professor, Industrial Engineering, University of Washington

Rick Self

Senior Vice President, ATI



5300 International Blvd.
Charleston, SC 29418



A Word from the Director on the Creation of the Center for Naval Shipbuilding Technology



Glover

Project selection is the key process for the Center, which begins when ONR consults with the Navy's acquisition community to determine which ship construction programs will be the focus of CNST projects for the coming year. CNST contacts the builders of those ship classes to identify the manufacturing technology issues that most affect them, which are then analyzed by industry, ONR and the appropriate Program Executive Offices (PEOs) in a down-select process that determines what projects best serve the program objectives and promise to deliver the best "bang-for-the-buck" within

the available funding. To date, two rounds of project selection have been completed. The process has resulted in 11 projects that support PEO-Carriers, PEO-Submarines and PEO-Ships. This issue of the Signal includes brief descriptions of the projects that are currently underway. You'll notice they cover a wide range of shipyard processes, including facility design and organization, improved welding processes and equipment, inspection techniques and supply chain management. Some are shipyard-specific and others are platform-specific, but many have the potential for implementation across the Navy shipbuilding enterprise. In future issues of the Signal we will concentrate on updating project status and results, with a particular emphasis on the efforts to transition the technologies from the laboratory to the shipyard and the sharing of those technologies among all the builders and repairers of U.S. Navy ships. If you're interested in additional project details, please contact us at cnst@aticorp.org or visit our website, www.cnst.us.

the available funding.

In future issues of the Signal we will concentrate on updating project status and results, with a particular emphasis on the efforts to transition the technologies from the laboratory to the shipyard and the sharing of those technologies among all the builders and repairers of U.S. Navy ships.

If you're interested in additional project details, please contact us at cnst@aticorp.org or visit our website, www.cnst.us.

Sincerely,

Visit CNST at These Upcoming Events

ShipTech 2005

March 1-2, 2005; Biloxi, Miss.; Beau Rivage Resort

The two-day event is intended as a forum for the domestic shipbuilding industry, its supplier base, the U.S. Navy Program Offices and the U.S. Navy-sponsored shipbuilding research programs to exchange information on shipbuilding technical developments. Featured will be advances generated respectively by the National Shipbuilding Research Program and the Navy ManTech Program through its Centers of Excellence and related shipbuilding initiatives.

ASNE Day 2005

April 26-27, 2005; Virginia Beach, Va.; Virginia Beach Pavilion

It has become increasingly apparent to

U.S. and allied nations that effective coalition naval operations are a critical enabler for pursuing the global war on terrorism while remaining properly responsive to disparate regional conflicts. This symposium intends to provide an interchange on the naval engineering implications of improving the way we prepare for, support and conduct coalition naval operations.

Defense Manufacturing Conference

Nov. 28-Dec. 1, 2005; Orlando, Fla.; Orlando World Center Marriott

DMC '05 will bring together leaders from government, industry and academia to exchange perspectives and information about the DoD ManTech Programs, defense industrial base issues and related transformational initiatives.

Wireless Automated Diagnostic continued from page 1

of diagnostic and prognostic evaluation and improving connectivity for key parameter sensors should provide the indications needed to prevent catastrophic equipment failure, thus reducing operating and repair costs. The wireless automated diagnostic and prognostic system will send indication and details of potential failure to a network that will allow time for the responsible technician and supervisor to analyze data and make maintenance decisions that consider the construction schedule.

For Phase I, the team has selected the mobile diesel engines that will be evaluated, have determined the parameters that must be monitored and have begun to develop the required software algorithms and hardware components. The specific types of mobile diesel equipment that are used by each of the shipyards were evaluated during a physical environment analysis of equipment. The goal for the analysis was to determine the

type of problems/failures that have or could occur on the equipment. At Northrop Grumman Ship Systems in Pascagoula, Miss., the project team discussed with the Ship Systems Facilities Department the different types of mobile diesel equipment that is being used and which pieces of equipment are most problematic. It was determined that one specific type of crane has presented itself as a problem. Over the past five years, two engines in the same crane have been replaced and one engine in another of the same crane type has been replaced, as the engines had seized or bearings had failed. Based on the review of maintenance and failure data, a few of the selected parameters to be monitored include vibration, oil temperature, oil pressure and air intake pressure.

For more information related to the wireless automated diagnostic and prognostic equipment project and all 11 ongoing CNST projects, visit the CNST website at www.cnst.us.

CNST Kicks Off Seven New Projects continued from page 1

passes with a mechanized/automatic system. The system will integrate the latest off-the-shelf technology to integrate the hybrid pipe welding system into the shipyard's normal production processes.

Another project that supports the CVN-21 construction program is the development of a digital radiography system that uses computed radiography techniques. Current radiographic inspection processes consume expensive, non-reusable film and chemical systems that drive up the cost and contain materials such as silver that are potentially hazardous to the environment. The desired digital radiography system will employ reusable phosphorescent plates that require no chemical development and offer an immediate indication of weld quality. An added benefit is the digital format that facilitates a more compact, convenient storage of images. The project team of Northrop Grumman Newport News and Fuji NDT are funded for this 19-month effort at \$361,000.

The fourth project will evaluate the effectiveness of commercially-available predictive weld distortion software and implement construction methods that minimize re-work due to distortion. This 16-month, \$500,000 effort is led by Northrop Grumman Newport News, who is teamed with Battelle Memorial Institute and ESI North America to develop material models, perform analysis, measure as-built construction and validate and implement the predictive methods. The validated software packages will allow shipyards to effectively predict the amount of distortion that will result in a wide variety of shipboard structures. The packages will be capable of evaluating various welding sequences and welding parameters, enabling the welding engineer to select the best combination to effectively

reduce the amount of weld distortion.

The fifth project is another predictive weld distortion effort. This 24-month, \$989,000 project is led by Electric Boat Corporation, who has teamed with Battelle Memorial Institute, ESI North America and the Edison Welding Institute. This project will also investigate the applicability of weld distortion prediction software, but will specifically focus on the circularity of submarine hull sections to significantly reduce the costs associated with correcting weld distortion in the VIRGINIA Class construction process.

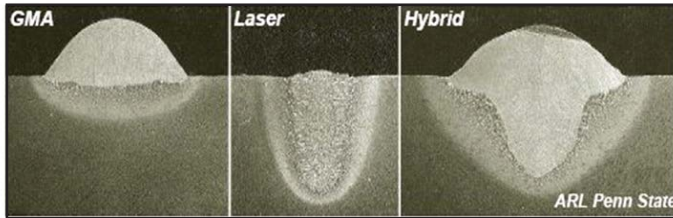
The sixth project is an effort to re-engineer the internal supply chain/material delivery process. Northrop Grumman Ship Systems leads the project, whose team members include Northrop Grumman Information Technology, Inc. and the Gulf Coast Region Maritime Technology Center, University of New

Orleans. Their combined efforts will focus this 12-month, \$500,000 project on reducing the supply chain problems that result from misplacement of material and disruption in workflow within the shipyard.

The seventh project will design

and implement a modern system for an extensive quality training program for craftspeople. The 12-month, \$500,000 effort is led by Northrop Grumman Ship Systems, partnering with Northrop Grumman Information Technology, Inc. and the Gulf Coast Region Maritime Technology Center, University of New Orleans. The system will allow daily tasking, status updates and quality performance analysis for individual structural welders. It will include comprehensive Visual Testing Level II instruction and on-the-job statusing with trained mentors.

For project status updates, please visit www.cnst.us.



A hybrid laser/GMAW pipe welding system will provide radiographic-quality welds in one or two passes.



CNST Project Portfolio Summary

Project / Team	Funding	Supports
Product-Centric Facility Design		
Electric Boat and Penn State ARL	\$1.2M	PEO Subs (VIRGINIA Class)
Validation of Weld Distortion Prediction Software for Implementation in VIRGINIA-Class Submarine Construction		
EB, Battelle Memorial Institute, ESI Group and Edison Welding Institute	\$989K	PEO Subs (VIRGINIA Class)
Digital Radiography Alternative to Film Radiography for Weld and Casting Inspections		
Northrop Grumman Newport News and Fuji NDT	\$361K	PEO Carriers (CVN-21)
Wireless Automated Diagnostic & Prognostic Equipment on Shipyard Facility Diesel Engines		
NGNN, Northrop Grumman Ship Systems and RLW, Inc.	\$434K	PEO Carriers (CVN-21)
High Heat Input Welding of Thick HSLA-100 with Reduced Preheat		
Northrop Grumman Newport News	\$179K	PEO Carriers (CVN-21)
Numerical Analysis in the Study of Predictive Weld Distortion in Thick Navy Structures		
NGNN, Battelle Memorial Institute and ESI Group	\$450K	PEO Carriers (CVN-21)
Laser/GMA Hybrid Pipe Welding System		
Penn State ARL and National Steel and Shipbuilding Co.	\$1.3M	PEO Ships (T-AKE)
Portable Weld Inspection Management System		
Bath Iron Works, Edison Welding Institute and ServoRobot	\$369K	PEO Ships [DDG-51 and DD(X)]
Comprehensive Technical Training and Data Collection Program for Structural Welders and Fitters		
NGSS, Northrop Grumman IT and University of New Orleans	\$499K	PEO Ships (LHD-8, LPD-17 and DDG-51)
Re-engineer Internal Supply Chain/Material Delivery Process		
NGSS, Northrop Grumman IT and University of New Orleans	\$498K	PEO Ships (LHD-8, LPD-17 and DDG-51)
Visit http://www.cnst.us/projects/projects_ongoing.htm for more details on these projects.		

Center for Naval Shipbuilding Technology
 5300 International Boulevard
 Charleston, SC 29418

The CNST Signal

is published periodically for the public/private U.S. shipbuilding community. Questions and comments about this publication may be e-mailed to Heather Wilson at wilson@aticorp.org. Additional information about CNST activities can be found on our website at

www.cnst.us