

Trade Friendly Locating Dimensional Techniques



ManTech Project Number: S2550

NSRP All Panel Meeting Digital Design & Manufacturing Tools

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GENERAL DYNAMICS
Electric Boat



*Trade Friendly (S2550)
2015 NSRP All Panel*

Agenda



- **Project Goals**
- **Project Execution**
- **Project Team Structure**
- **Candidate Technologies**
- **Accomplishments**
- **Next Steps**
- **Questions**

Project Goals



- **Research and apply new COTS Metrology technology to the trade level**
 - ↗ Replace or enhance common mechanical measurement tooling
 - Reduce repetitive measurement
 - Replacement of the use of steel wire installation for formation reference lines
 - Reduce layout and locating times
 - Provide xyz coordinates instantly
 - ↗ Through the increased use of,
 - Indoor GPS
 - Radio frequency locating
 - Non-Line-Of-Sight technology (NLOS)
 - Laser locating technology
- **Target cost reduction opportunity for VCS and OR**
 - ↗ VCS and OR cost reduction opportunity of \$860K per ship
 - Reduction of 11K man hours
- **Share improvements with other shipyards**

Project Execution



- **Phase I – Requirements, Analysis, Market study, Testing and Evaluating**
 - ↗ Initiate project, investigate/document tradesman metrology projection assembly requirements
 - ↗ Metrology projection equipment market study
 - Go/No Go Decision
 - ↗ Identify process improvements
 - ↗ Develop prototype metrology inspection system specification
 - ↗ Phase I reporting
 - Go/No Go decision

Project Execution (Cont.)



- **Phase II – Execute Process Improvement Plan/Prototype**
 - Develop prototype of the Trade Friendly Metrology Inspection System
 - Implement process improvements
 - Phase II final reporting

Project Team Structure



Warren Southerland – Project Manager
Barry Espeseth – Project Technical Representative



Charles McNamara – PMS450
Dave Hart – LCE



Byron Rose – PMS397
George Becker – BAH



Timothy Bair
Sean Krieger – Technical Contact
Paul Swanson – Technical Contact



Joe Gross – Technical Contact
Mimi Reis – Program Manager
Christopher Bragg – Project Coordinator

Candidate Technologies



- **The three vendors / technologies selected for the second round of demonstrations at the Electric Boat Quonset Point Facility are,**
 - AICON 3D
 - Creaform, C Track 780
 - Leica 3D

- **Additional Technologies being investigated**
 - Leica Disto D5 or D810

Candidate Technologies (Cont.)



- **AICON 3D**

- High Level Functions

- Dynamic tracking functionality – freedom of movement through optical tracking
 - Precise measurement in an unstable environment – Dynamic Referencing
 - Tripod stability not required
 - Digital cameras in robust industrial housing
 - 3D measuring by tactile probing
 - Measuring volume: 100 cubic meters
 - Weight: 10 Kg (22 lbs)
 - Typical Accuracy: <.02mm (.0008 in.) for 1 m³



Candidate Technologies (Cont.)



- **Creaform, C Track 780**

- High Level Functions

- Dynamic tracking functionality
 - Tripod stability not required, instantly portable with HandyPROBE system
 - Accurately measure 1 – 10 Meters
 - Compatible with SA software
 - HandyProbe weight: 1 lb.
 - 5-minute learning curve, intuitive system.
 - Accuracy to +/- 25 microns (.00098 inches)
 - Self-calibration system



Candidate Technologies (Cont.)

- **Leica 3D**
 - High Level Functions
 - Full automatic or manual modes measure in three dimensions
 - 360° Horizontal, 250° Vertical
 - Measurement range of 0.5 to 50 meters
 - Accurate to 1mm at 10 meters
 - Can project points of new locations once tied in to the reference grid
 - Digital Pointfinder
 - Tripod mountable
 - Hand held remote control



Candidate Technologies (Cont.)



- **Leica Disto D5 or D810**

- High Level Functions

- Advanced handheld measuring tool enabling single person measurements
 - Portable measuring tool with a digital pointfinder and high-resolution color display
 - 45-degree tilt sensor helps to determine horizontal distances
 - 656-foot measuring range
 - Measurements of up to 328 feet without needing a target plate
 - Accuracy $\pm 1/16$ inch
 - Built-in tripod thread and a flip-out multifunctional endpiece for use when measuring from corners or edges.
 - Internal storage memory that can save up to 20 measured values, so you'll never need to write down another result.
 - Comfortable to hold with its ergonomic design and soft-grip sides but can also be carried in your pocket.



Accomplishments



- **The Electric Boat Corporation and iMAST Project Team visited the Electric Boat Quonset Point Facility**
 - ↗ Requirements data collection
 - ↗ Discussed building plans at QP and potential incorporation of this technology in those plans
 - ↗ Determined the correct reference system to tie into with new technology
 - ↗ Toured axis vertical and horizontal modules
- **Completed the Requirements Document**

Accomplishments (Cont.)



- **Sean Krieger, iMAST, attended the CMC conference and briefed the team on the conference**
- **Completed the Initial Market Survey Report**
 - Revision A to be provided once the vendor demonstrations are complete
- **Selected 8 vendors, from an initial list of 27 technologies, to provided the assessment team with a demonstration of their technology**
- **Three vendors have been selected based on the first round of demonstrations and are preparing for final testing for the selection of a prototype system**
- **The test object for the second round of vendor demonstrations was selected, surveyed, and staged**

Accomplishments (Cont.)



- **The Disto laser measurement tools were identified as a “go do it” process improvement**
 - The tools have been provided to the trades personnel at the Electric Boat Quonset Point Facility in order to assess the functionality of this tool.

Next Steps



- **Hold the second vendor demonstration**
- **Submit Revision A to the Market Survey Report**
- **Complete the first Go/No-Go Deliverable and Meeting**
- **Begin evaluating the cost benefit analysis by employing the prototype in the field**
- **Document additional opportunities for process improvement**
- **Continue to evaluate the Leica Disto laser measurement tools at the Electric Boat Quonset Point Facility**

Questions

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