Navy ManTech Program

Center for Naval Metalworking (CNM)

Mark Snider, Director

NATIONAL SHIPBUILDING RESEARCH PROGRAM™
Taking Shipbuilding and Repair to the Next Level

NSRP All Panel Meeting
28 March 2023

Background

Mission: Identify, develop, and facilitate the deployment of potential solution sets, in this case that of metalworking or related manufacturing technologies, to domestic shipyards, factories, and other industrial facilities to reduce the cost and time to build and repair key naval and defense platforms and systems.

- ATI's Virtual COE Model: Deliver the best value to the Navy by:
  - *Employing our proven successful virtual center model*
  - *Teaming with Navy OEMs, industry experts, and the best technology providers*
  - *Driving state of the art solutions from the best available sources to implementation on target platforms*

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Stakeholders, Partners & Results

Results:

- Transition Rate **74%**
- Over **$534M** in Projected Navy Cost Savings (Completed & Active Project Portfolio)
- 15 Active Projects (**16 additional** in development)

Navy ManTech
can depend on a continuation of highly relevant research projects with widespread implementation from...

An Established Center
with unparalleled experience in program management and efficient technical, contracting, and financial operations

Strong Stakeholder Relationships
across Navy commands, laboratories, and funders with related interests and projects

Collaboration with Key OEM
shipyards and avionics system integrators and their supply chains

Diverse Tech Providers
with expertise across all primary and secondary focus areas

Center Structure

NAVY MANTECH

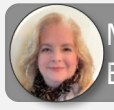
Requirement definition and prioritization
Strategic leadership

CNM Leadership:

- Program oversight
- Project development and execution
- Administrative, financial, and contract management


Mark Snider
Director


Jeremy Brougher
Technical Director


Melissa Frady
Business Manager


Skip Solis
Contracts Manager

Technical Consultants

- ATI
- CTC
- EWI
- LGK
- Metalcasting Design

Contracting Team

6 Subcontract Administrators

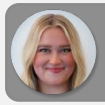
Resource Network

Platform OEMs

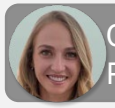
- FMM
- GDBIW
- GDEB
- HII – Ingalls
- HII – NNS
- Lockheed Martin

Technology Providers

Universities


Brooke Ellis
Program Admin


Sean McDowell
Project Manager


Chelsea Nugent
Project Manager


Chance Roman
Project Manager


Josh Marion
Project Manager


Dan Meath
Project Manager


Dan Reed
Project Manager


Paul Blomquist (EWI)
Sr. Tech Advisor

CNM Program Team: Technical oversight, milestone tracking, status reporting, risk management, invoicing review and approval, and project closeouts

CNM
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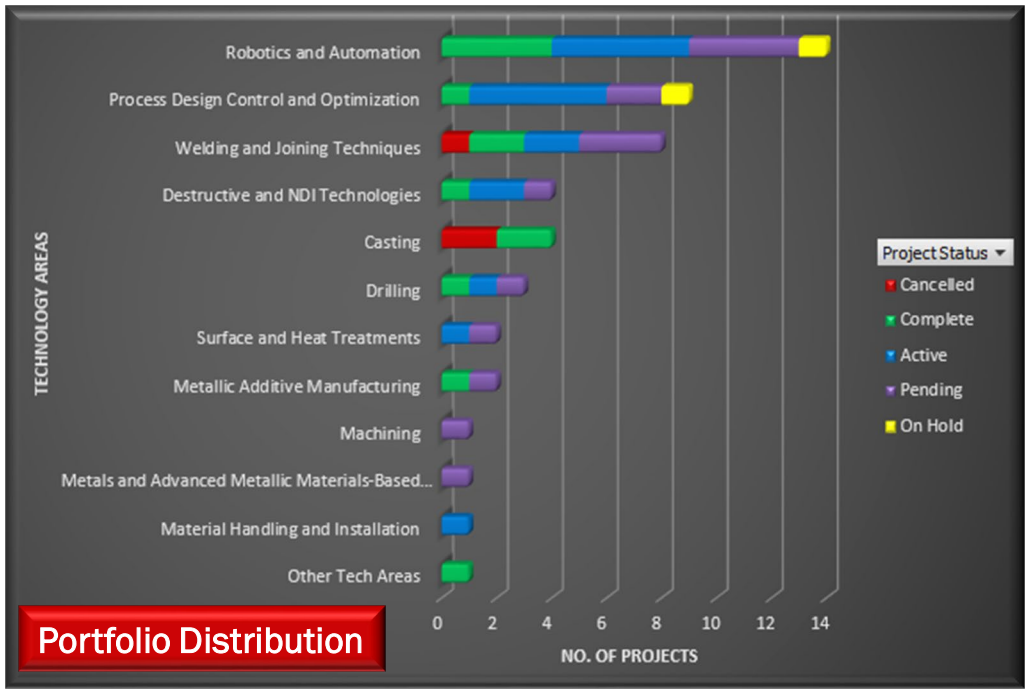
CNM Technology Areas

Primary:

- Primary Metalworking and Related Manf. Processes (Casting, Forging, Rolling, Machining, Drilling, etc.)
- Metals and Advanced Metallic Materials-Based Systems
- Welding and Joining Techniques
- Robotics & Automation



Portfolio Distribution

Secondary:

- Metallic Additive Manufacturing
- Surface and Heat Treatments
- Metal Manufacturing Process Modeling and Simulation
- Process Design Control and Optimization
- Destructive and Non-Destructive Inspection (NDI) Technologies
- Material Characterization and Testing
- Metallic to Non-Metallic Joining and Interface Issues
- Application and Removal of Coatings, Paints, and Similar Treatments for Metallic Substrates
- Metal Matrix Composites
- Material Handling and Installation
- Ceramics and Ceramic Matrix Composites
- Other technology areas as directed or approved by the ManTech Program Office

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Automated Pipe-Fitting Scriber

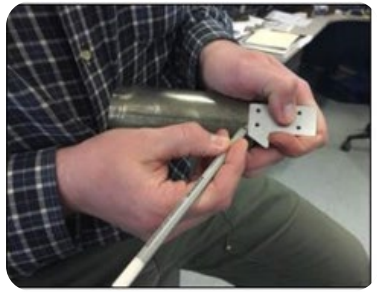
PEO	Shipyard Lead	Project Status	Cost Savings
Ships (PMS 400)	General Dynamics Bath Iron Works	Complete	

Objective

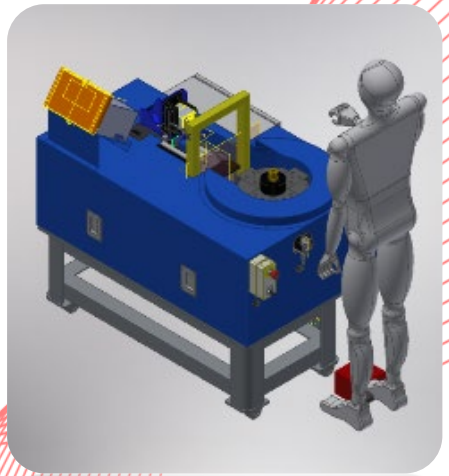
- Develop an automated mechanism for producing permanent and accurate circumferential scribe marks for socket welded pipe fitting.
- Automating the scribing process will reduce ship cost by reducing scribing labor, handling time, VT inspection labor, and re-work.

Approach

- The automated prototype scribing unit was created using a modifications of commercial-off-the-shelf (COTS) hardware.
- Requirements were identified, followed by the creation of demonstration test plans.
- The developed prototype was evaluated by scribing a variety of fittings used as mock-up test articles. Initial assessment demonstration have been completed. Prototype now at BIW for user acceptance testing.



GDBIW pipe scribe gauge with Omnichrom 108 heat resistant pencil



Prototype Design of developed automated system

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Shaped Plate Automation

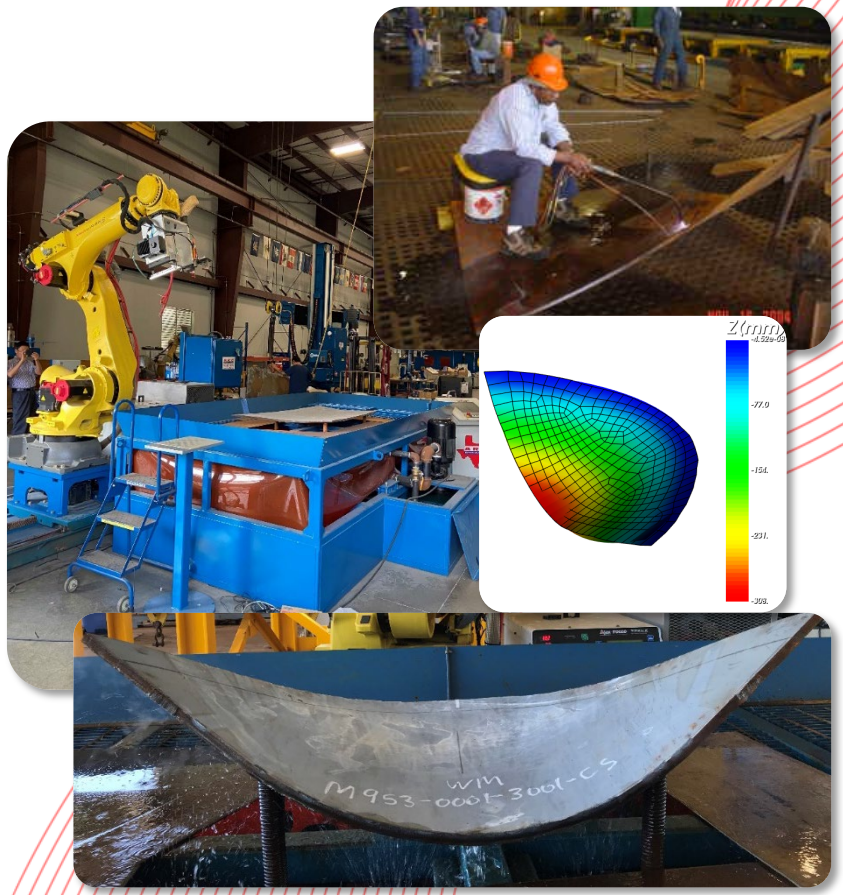
PEO	Shipyard Lead	Project Status	Cost Savings
Ships (PMS 400)	Ingalls Shipbuilding	Complete	$17.6M (5 year) RoI = 2.7

Objective

- Reduce the manual labor required in shaping and verifying shell plates through robust automated processes.
- Enable rapid positioning and alignment of shell plates on the pin-jig fixtures prior to welding.

Approach

- Investigated optimal software and hardware systems to automate the plate shaping and verification processes.
- Understand material responses to the selected approach (induction heating) for automated plate shaping.
- Developed a prototype system to evaluate the plate shaping and verification processes.
- Developed a prototype pin-jig fixture and verification method for positioning shell plates.



Deep Hole Drilling

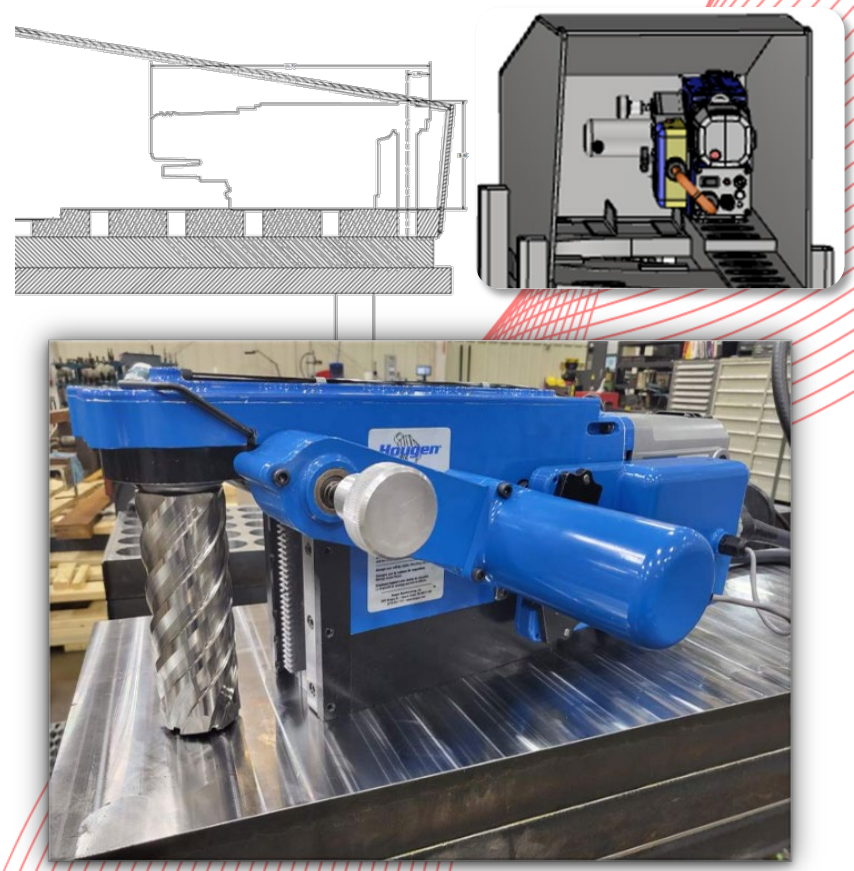
PEO	Shipyard Leads	Project Status	Cost Savings
Ships (PMS 378 & PMS 400)	Bath Iron Works & Newport News Shipbuilding	Complete	$4.5m (5-Year) RoI = 3.4

Objective

- Develop a portable and low profile drill capable of drilling through 6.75” of high strength steel with extremely tight tolerances.
- Reduce the experienced by the operators.

Approach

- Investigated the current off the shelf options and evaluate suppliers on ability to produce a new prototype drill
- Established performance criteria and feature requirements for the prototype system
- Developed a mockup representative of the use cases to verify fitment for implementation
- Evaluated the prototype system and compared against current drilling processes



Cold Cutting Steel

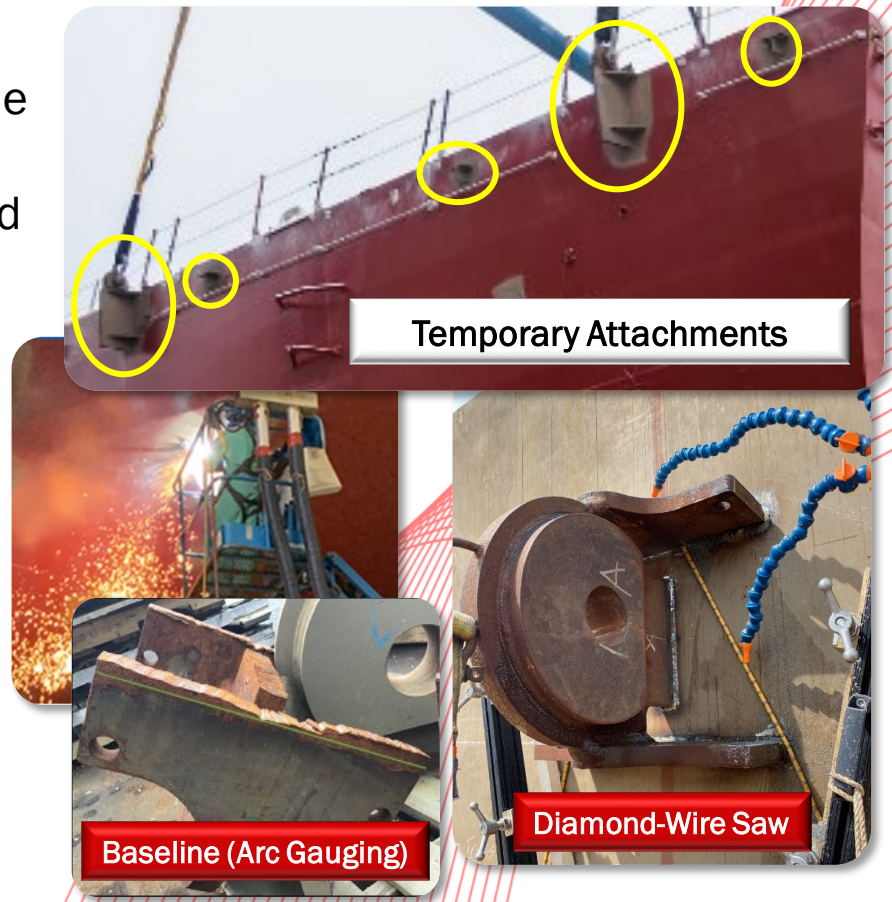
PEO	Shipyard Lead	Project Status	Cost Savings
Ships (PMS 400)	General Dynamics Bath Iron Works	Complete	$3.4M (5-Year) RoI = 0.53

Objective

- Reduce/eliminate the damage from hot work methods used during the removal of temporary lifting attachments
- Increase the number of times the temporary attachments can be used by improving cut quality during removal

Approach

- Defined use cases and evaluated potential vendors with portable steel cutting capabilities
- Developed and constructed a representative mockup to provide the unique challenges during validation testing
- Developed a COTS/prototype system to evaluate temporary attachment removal during construction
- Evaluated and compared the cutting process and quality of the cut to baseline processes



Portable Welding Robot

PEO	Shipyard Lead	Project Status	Cost Savings
Submarines (PMS 397 & PMS 450)	General Dynamics Electric Boat	In Process	$9.8M (5 year) ROI = 1.79

Objective

- Investigate, develop, and prototype a portable robotic welding solution that reduces welding labor hours and increases weld quality.
- Bring the robot to the work, not the work to the robot

Approach

- Leverage knowledge of COTS portable welding robot technologies to develop an optimal solution for shipbuilding.
- Work with end users and robotic integrators.
- Defined requirements for system / weld procedure qualification.
- Verify prototype system design, performance, and scalability via Demonstration and Qualification Support Test Plans.

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CNM Project Focus

- Advancing the state of the art for metallic materials
- Implementing major innovations in joining technology
- Automating labor intensive and critical processes
  - ➢ Improving safety, quality, and productivity
- Developing robust, repeatable, and scalable metallic additive processes
- Adapting new production methodologies to maintenance, repair, and overhaul needs
- Always looking to accelerate the capabilities of the Navy
  - ➢ Get new ships in the water earlier
  - ➢ Support the innovative vessel concepts of the future Navy

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The TEAM

CNM is a government/industry/academia partnership. Organizations and individuals from a variety of disciplines are engaged as needed to solve technical challenges and improve manufacturing processes.

The MISSION

CNM will identify, develop, and deploy metalworking and related manufacturing technologies to reduce the cost and time to build and repair key naval platforms and other relevant industries.

The MODEL

CNM is a Navy ManTech Center of Excellence, with single point contracting through ATI. Teamed with the Edison Welding Institute (EWI), CNM provides robust capabilities to address the DoD manufacturing industrial base , including state-of-the-art metalworking labs and deep expertise in key technology areas. From virtual project management to innovative prototypes, CNM delivers tailored solutions.

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