Workforce Development - Project Ideas Presentation Meeting

August 7, 2020

Virtual Meeting

Disclaimers and Ethics

- We will review projects drafts today

- Projects are due to ATI and the Panel Chair by until August 12th, 2020 @12 pm ET

- Ethical Expectation
  - Draft projects shared are not repackaged and submitted by another group before the deadline
  - Voting members of WFD will seek to gain insight and provide feedback to proposers to improve white papers and prepare for voting
  - Potential panel project presenters will have the opportunity to present their projects and solicit interested participants as necessary

Agenda

Time Eastern	Time Pacific	Presentation	Speaker
11:00	8:00	Welcome and Introductions	Maurissa D'Angelo, WFD Panel Vice Chair
11:10	8:10	NSRP Program Update	Mark Smitherman, NSRP / ATI
11:20	8:20	Objective Review	Maurissa D'Angelo, WFD Panel Vice Chair
11:30	8:30	Project Summaries Comments and Questions	Submitted Proposals Leads
1:00	10:00	Recap and Discussion	Maurissa D'Angelo, WFD Panel Vice Chair

Program Update

Workforce Development Panel Projects Idea Presentation Meeting

August 7th, 2020

Virtual

NSRP Mission

The mission of the National Shipbuilding Research Program is to reduce the total ownership cost and improve the capabilities of both United States Government and U. S.-flag commercial ships.

The Program accomplishes this mission by providing a collaborative framework to manage, focus, develop and share research & development, and leverage best practices in shipbuilding and ship repair.

NSRP Collaboration

Anti-Trust Rules

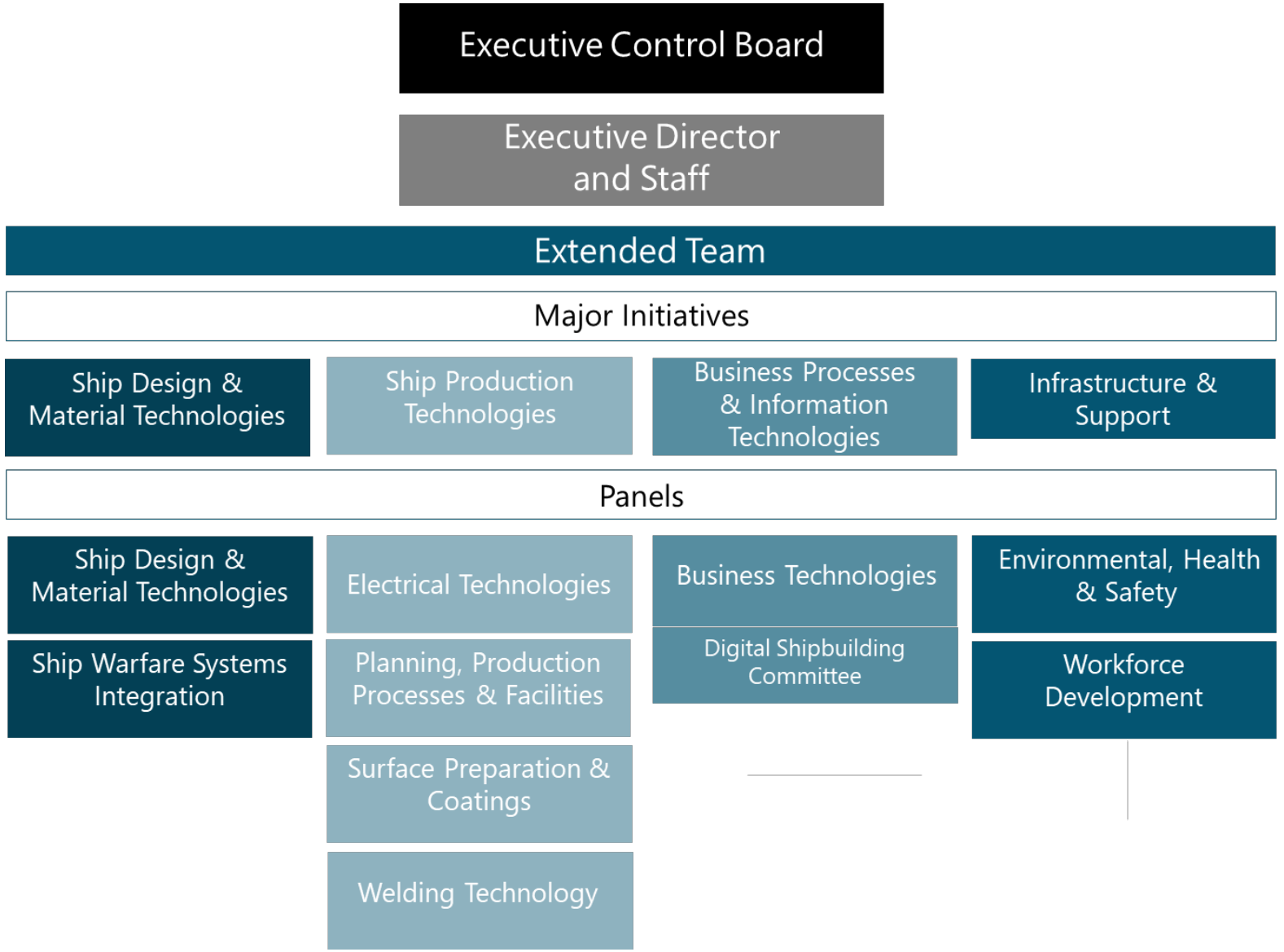
- Regarding your company's and/or your competitor's **product & services**:
  - Do not discuss current or future prices.
  - Do not discuss any increase or decrease in price.
  - Do not discuss pricing procedures.
  - Do not discuss standardizing or stabilizing prices.
  - Do not discuss controlling sales or allocating markets for any product.
  - Do not discuss future design or marketing strategies.

Anti-Trust Rules

- Regarding your company's and/or your competitors' selection of their **supplier companies**:
  - Do not discuss refusing to deal with a company because of its pricing or distribution practices.
  - Do not discuss strategies or plans to award business to remove business from a specific company.

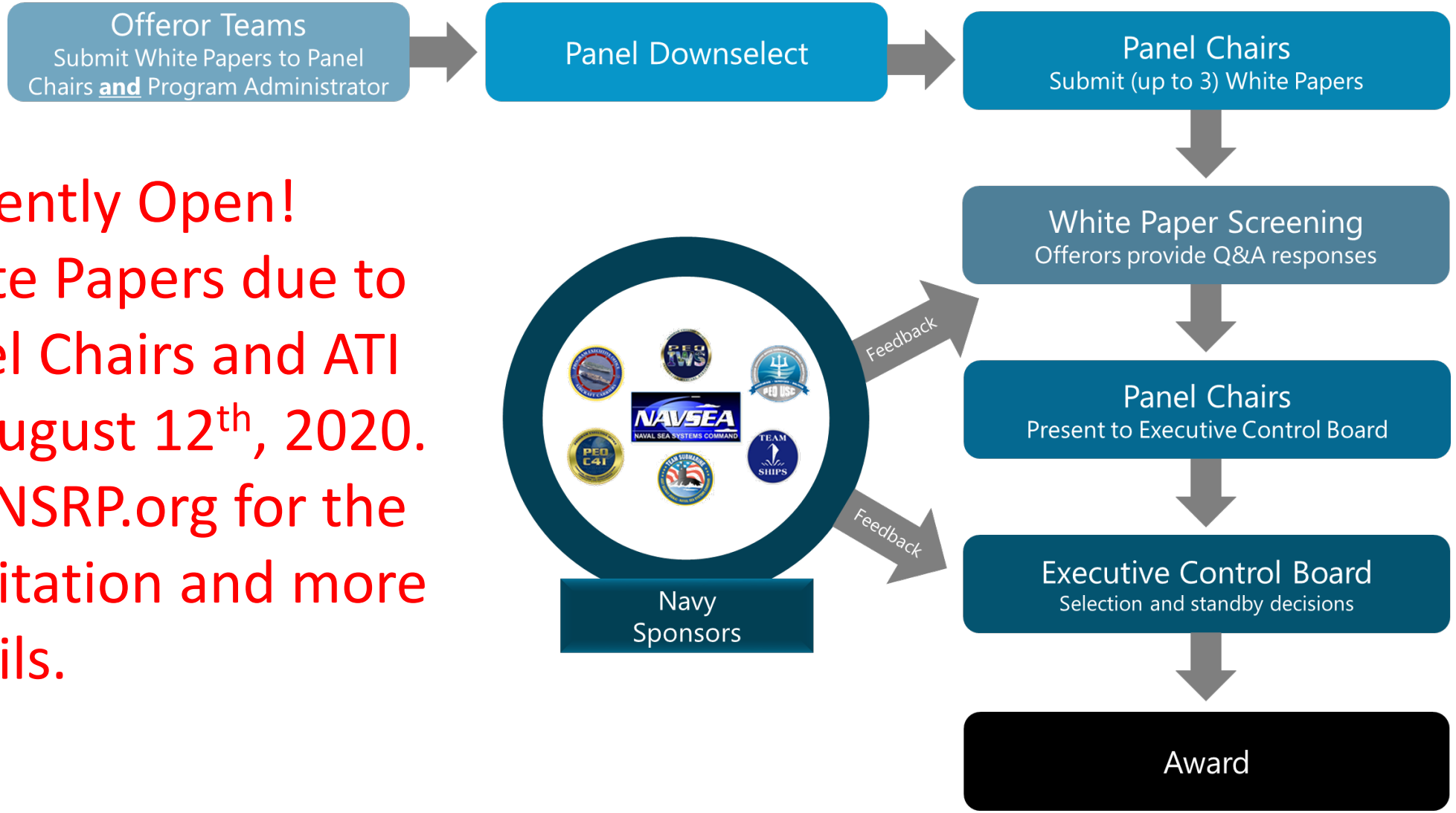
- Regarding your company's and/or competitors' **trade secrets**:
  - Do not discuss trade secrets or confidential information of your company or any other participant.

Organization



Panel Project Proposal Process

Currently Open!
White Papers due to Panel Chairs and ATI by August 12th, 2020.
See NSRP.org for the solicitation and more details.



Panel Project Requirements

- Official requirements can be found in the Panel Project Solicitation and the Panel Project Guide Vol 1 located at https://www.nsrp.org/resource-library/:
- Deadline for Offerors to submit white papers to Panel Chairs ***and*** ATI is 12:00 p.m. (noon) ET on **August 12, 2020**.
- Deadline for Panel Chairs to submit top three white papers and any joint panel papers to ATI is 12:00 p.m. (noon) ET on **September 9, 2020.** Panel Chairs shall submit white paper(s), using the White Paper Submission Module.
- Deadline for Offerors whose white paper is one of the panel's top three to submit to ATI the Supporting Cost Data Table, required by the Panel Project Guide Vol 1 – Offerors Rev. T, is **September 9, 2020**.
- **NOTE: White paper submitters are reminded that each Panel Chair will have interim due dates to accommodate their panel's down-select process prior to submission to ATI. Please regularly check the NSRP website for those dates.**
- *Any questions can be directed to Ryan Schneider (ryan.schneider@ati.org) or Sarah H. Swain (sarah.swain@ati.org).*

Panel Project Requirements

- NSRP Executive Control Board member shipyards and panel members (as defined by individual panel membership by-laws) may submit white papers.
- No more than $150K in program-funded costs (Note: Fee or profit is not allowed)
- No more than 12 months in duration
- At least one member shipyard should be a project participant – ***multiple shipyard participation is strongly encouraged.*** An endorsement email for each participating member shipyard, specifically, an email from that yard's NSRP Shipyard Delegate (NSD) must be attached. These endorsement pages do not count toward the three page limit.
- If a Government organization will participate in the project, provide the name and contact information for the government point of contact who agreed to participate. If there is any issue with obtaining this information, offerors should contact the NAVSEA NSRP Program Engineer, Mr. Howard Franklin, at howard.l.franklin@navy.mil or (202) 781-2171 for early coordination.

Panel Project Requirements

- Offerors shall submit white papers directly to the appropriate Panel Chair and ATI (nsrp@ati.org).
- Any proposed prime contractor shall ensure all subcontractors will agree to the terms and conditions of NSRP's standard Base Task Order Agreement prior to submission of a white paper.

Panel Universal By-laws

- At minimum, panel voting membership will include all of the member shipyards.
- Each organization gets only ONE vote. If an organization has a qualified voting member in a NSRP leadership position (Panel Chair, Panel Vice Chair, or Major Initiative Team Leader) the organization will have an additional vote (not to exceed two votes).
- Except for member shipyards, organizations must meet panel membership requirements, as defined in the individual panel by-laws, to propose a panel project or vote in panel voting activities.

Panel Projects for Discussion

- Fitter Training Program for Precision Fillet Weld Tacking
- Shipbuilding Apprenticeship: A Qualitative Analysis
- *Smart glove to improve workforce manufacturing productivity*
- *Digital Tracking and Analysis of Human Shipbuilding Activities*
- Fiber Optics – Knowledge Capture and Dissemination
- Ruggedized Decontamination Unit – Worker Safety
- *Platform Cybersecurity Suitability*
- *Modern Shipbuilding Design Course 3*

Fitter Training Program for Precision Fillet Weld Tacking

EWI, Ingalls, BIW
D. Harwig, TD Huang, T. Stevens

Concept/Idea

- **Issue:** Excessive panel distortion impedes neat construction, and promotes ongoing rework . Leading contributor is stiffener overwelding that is 2X to 4X+ allowable fillet weld size. Overwelding begins in the **fitter tacking stages** and is compounded throughout panel and unit construction. Precision tacking enable precision fillet welding, reduces overwwelding and distortion, and reduced rework.
- **Proposed Solution(s):** Develop a fitter training program for precision tacking.

Benefits/Justification

Benefits of the project

- Build culture for neat construction and first time quality
- New training methods and procedures for precision cleaning & tacking
- Reduced welding-induced buckling distortion and downstream rework
- Reduced costs for unit construction and flame straightening
- Reduced welding & grinding costs
- Reduced weight induced by over welding

Project Approach

High level statement of work

- Determine welding apparatus for precision tacking
- Develop robust GMAW/ FCAW procedures for precision tack welds,
- Develop training modules, videos, and workmanship samples
- Train a group of fitters and gather feedback
- Determine implementation plan at Ingalls Shipbuilding and BIW

Metric(s) of Success

- Enable automated precision fillet welding
- First time weld quality; mitigate repair and compounded overwelding
- Reduce distortion of production panels
- Reduce down-stream fitting and flame straightening costs

Cost/Schedule

- **Project Cost:** $150K
- **Deliverables:**
  - Recommended GMAW/FCAW equipment, apparatus, and consumables,
  - Precision tacking welding procedures,
  - Training modules
  - Fitter precision tacking test joints and qualification test designs,
  - Videos, posters, and workmanship samples
  - Piloted training program at Ingalls

GENERAL DYNAMICS
Bath Iron Works

Shipbuilding Apprenticeship: A Qualitative Analysis

Scott Christman

NSRP – Workforce Development Panel

August 2020

Shipbuilding Apprenticeship: A Qualitative Analysis

Prime/Lead: GD-Bath Iron Works

Project Idea

Share current best practices relating to shipbuilding apprenticeship programs:

- Team with Shipyards and Industry Experts
  - Participating Shipyard: Up to 8 Shipyards
  - Tech. Consultant: American Apprenticeship Round Table (www.aart-us.org)
  - Tech. Consultant: American Institute for Innovative Apprenticeship (www.innovativeapprenticeship.org)
- Incorporate best practices and new technologies/equipment

Objectives

1. Coordinate & fund a national multi-day conference
2. Extract, study, synthesize and share current best practices
3. Share the findings and recommendations with the shipbuilding industry and stakeholders.

Deliverables/Benefits/ROI

- Curriculum/road map for starting, maintaining or expanding a program
- Enhanced competencies and qualifications of entry- and mid-level new hires
- Trained employees = increased skills, first time quality, job satisfaction, motivation, innovation, and process improvement

Financial

$150k (no cost share)

BIW Lead:

- Dedicated Organizational Development Department Project Lead
- Cost Share w/up to 8 participating Shipyards

Shipbuilding Apprenticeship: A Qualitative Analysis

Prime/Lead: GD-Bath Iron Works

Tasks:

1. Design Survey of Current Practices in Shipbuilding Apprenticeship
2. Data Gathering
3. Conduct Roundtable Conference and Follow-Up
4. Compile Results
5. Provide a Final Report

Smart glove to improve workforce manufacturing productivity

Project Lead Organization: ESAB (Christopher Hsu) (chris.hsu@esab.com, 301-503-3148)
Project Team members: University of Kentucky, Newport News (TBD) and Ingalls (TBD)

Concept/Idea

Issue: Each US shipyard employs thousands of workers to build ships. There are various types of production processes done by skilled trades, e.g. welder, pipefitter, electrician, rigger, painter etc. Each worker may spend a small fraction of shift time on trade activity – e.g. 5% welding arc-on time, and non-trade activities dominate OEE. Management lacks data collection to track activities outside the assigned trade (95%) for value stream mapping, quantify or eliminate wastes & improve overall productivity.

Proposed Solution(s): Similar to Fitbit and Apple Watch, operators wear IOT smart work gloves with inconspicuous sensors to track activities that can be logged into database together with IOT equipped machine tool data for analysis. The objective is to use AI (artificial intelligence) analytics on the hand motion to classify operator activities, ultimately a new data-driven modality to systematically eliminate waste in shipbuilding production as driver for continuous and sustainable improvement.

Benefits/Justification

Benefits of the project

- Analyze worker's time distribution for optimization in causes of delays, workflow stagnation and bottleneck, and improve the work efficiency
- Analyze if the worker has followed the procedure specifications (e.g. weld) & early alert for possible issues to avoid weld defects, scrap or costly repair / rework
- Monitor and analyze worker's productivity above and beyond "arc on time" or machine utilization, e.g. pre-weld activities and post-weld activities
- Monitor workers safety & deactivate energy source if unsafe condition is detected
- Use built-in ID tag detectors in the glove for operator login and to ensure correct materials (e.g. filler metal, fixture) are used and machine settings are configured for the job in the next phase
- Provide the data for automatically monitoring the progress of shipbuilding in the next phase of the project that integrate data from all workers as feedback means to invigorate workforce development and on-the-job training

Project Approach

High level statement of work

- Review COTS and develop a smart glove prototype for worker during operations
- Process the data to detect the type of the production activities, e.g. linear welding, changing contact tips / liner, changing wire spool, chiseling /hammering, grinding, sweeping, moving and idle; its time periods and locations and compare with arc-on data recordings from welding/cutting equipment
- Digital record of weld procedure compliance beyond weld equipment data
- Detect unsafe work conditions

Metric(s) of Success

- Operator activities provide insight to the production control and supervisors
- Identify and eliminate non value-added activities and optimize standard work
- Identify and eliminate production bottleneck and improve workflow

Cost/Images/Relevant Information

Project Estimated Cost: $150K

The University of Kentucky has used the proposed sensor to monitor the travel speed in manual FCAW and achieved good accuracy and has used the monitored speed from this sensor to control a pipe welding process. This project will build upon the previous work and offer insight beyond welding to understand activities around welding and cutting (most of the operator time) to improve OEE with digital solutions. It can be extended beyond fabrication, to other production processes using skilled trades, such as assembly, erection, outfitting, equipment installation and testing, NDT, surface coating, transportation and rigging, etc.

Digital Tracking and Analysis of Human Shipbuilding Activities

Project Lead Organization: ESAB (Christopher Hsu) (chris.hsu@esab.com, 301-503-3148)
Project Team members: University of Kentucky, Austal USA (TBD), Newport News (TBD) and Bath Iron Works (TBD)

Concept/Idea

Issue: Each US shipyard employs thousands of workers to build ships. There are various types of production processes done by skilled trades, e.g. welder, pipefitter, electrician, rigger, painter etc. Each worker may spend a small fraction of shift time on trade activity – e.g. 5% welding arc-on time, and non-trade activities dominate OEE. Management lacks data collection to track activities outside the assigned trade (95%) for value stream mapping, quantify or eliminate wastes & improve overall productivity.

Proposed Solution(s): Similar to Fitbit and Apple Watch, operators wear IOT smart gloves PPE with motion sensors to track activities that can be logged into database together with IOT equipped machine tool data for analysis. The objective is to use machine learning on the hand motion to classify operator activities, ultimately a new data-driven modality to systematically eliminate waste in shipbuilding production as driver for continuous and sustainable improvement.

Benefits/Justification

Benefits of the project

- Analyze worker's time distribution for optimization in causes of delays, workflow stagnation and bottleneck, and improve the work efficiency
- Analyze if the worker has followed the procedure specifications (e.g. weld) & early alert for possible issues to avoid weld defects, scrap or costly repair / rework
- Monitor and analyze worker's productivity above and beyond "arc on time" or machine utilization, e.g. pre-weld activities and post-weld activities
- Monitor workers safety & deactivate energy source if unsafe condition is detected
- Use built-in ID tag detectors in the glove for operator login and to ensure correct materials (e.g. filler metal, fixture) are used and machine settings are configured for the job in the next phase
- Provide the data for automatically monitoring the progress of shipbuilding in the next phase of the project that integrate data from all workers as feedback means to invigorate workforce development and on-the-job training

Project Approach

High level statement of work

- Review COTS and develop a smart glove prototype for worker during operations
- Process the data to detect the type of the production activities, initially linear welding, later pipe welding, cutting, material handling and idle time; its time periods and locations and compare with arc-on data recordings from welding/cutting equipment
- Store the data and provide the analysis and statistics of daily operation for management to review

Metric(s) of Success

- Operator activities provide insight to the production control and supervisors
- Identify and eliminate non value-added activities
- Identify and eliminate production bottleneck and improve workflow

Cost/Images/Relevant Information

Project Estimated Cost: $150K

The University of Kentucky has used the proposed sensor to monitor the travel speed in manual FCAW and achieved good accuracy and has used the monitored speed from this sensor to control a pipe welding process. This project will build upon the previous work and offer insight beyond welding to understand activities around welding and cutting (most of the operator time) to improve OEE with digital solutions. It can be extended beyond fabrication, to other production processes using skilled trades, such as assembly, erection, outfitting, equipment installation and testing, NDT, surface coating, transportation and rigging, etc.

Fiber Optics – Knowledge Capture and Dissemination

NSRP Panel Meeting – 7 August 2020

D’Angelo Technologies, LLC (D5T)

Overview

- Objective – Initiate a shipyard fiber optics training program
  - Capture procedures and techniques
  - Leverage previous panel efforts for specific procedures of fiber optics installation, cleaning and termination
  - Cover installation through testing
  - Use virtual/augmented reality to capture and train complexities of fiber optic preparation, installation, and testing
- Virtual Reality (VR) based fiber optics training
- Knowledge capture from fiber optics experts
- Dissemination of this knowledge through training programs.
- Utilize the enhanced training capabilities of Virtual Reality and integrate the actual touch and feel of the installation and maintenance process.

Goals and Objectives

- **Team:** D'Angelo Technologies, LLC (D5T), The Pennsylvania State University Applied Research Laboratory Electro-Optics Division (EOC), Austal USA (discussion for additional participants)
  - All developed training modules
  - EOC - courses in EO topics including a 2-3 day course in fiber optics.
  - Austal has a need for fiber optics training within the shipyard for proper installation, maintenance, and operations.
  - D5T has several VR training modules that can be modified to meet the needs of this training.
- Transform the classroom training material into VR modules
- Ultimately, integrate training into fiber optics deployment training.
- Currently, within shipyards, materials and accredited trainers are tightly controlled by NAVSEA and there is a shortage.
- Additionally, there is a significant amount of tacit knowledge that needs to be properly captured for training – i.e. the tip of the fiber is properly cleaned when it makes a squeaking noise, the fiber is properly washed off when it has a smooth feeling.
- Of particular relevance during COVID pandemic and in preparation for future pandemics (optimized training for the future)

Ruggedized Decontamination Unit – Worker Safety

AGarvey, LLC

NSRP Panel Project Discussion – 7 August 2020

Ruggedized Decontamination Unit (RDU)

Developed by AGarvey, LLC - Women Owned Small Business

Problem Statement

- Shipyard and Navy Personnel are at risk of being exposed to epidemic, pandemic, infectious and biological diseases
- Typically, these individuals have available a limited supply of personal protective equipment due to supply weight and costs.

Solution

The Ruggedized Decontamination Unit (RDU) that can expand the duration and use of PPE. The RDU allows for the reuse of N95 Mass and can be designed to incorporate other PPE.

Description

- Small Scale Ruggedized Transportable Decontamination System
- UV-C LED System to decontaminate 12 N-5 Masks in Under 5 minutes
- Single push button start, no operator training, no hazardous chemicals
- Compact and light weight
- Standard Wall Plug or Battery Pack

Future Development Work and Need

- Optimized and reduce components
- Ruggedized shipyard and shipboard system
- Ruggedization testing (shock and Vibe)
- Increase manufacturability; Human Factors and real-world use feedback

Platform Cybersecurity Suitability

Project Lead Organization: HII-Ingalls Shipbuilding
Project Team members: HII, TSD

Concept/Idea

Issue: The complexity of determining the Cybersecurity status of an operational system is more challenging as threats emerge.

Proposed Solution(s): Improve the deployed Cybersecurity personnel's Situational Awareness to mitigate against the potential schedule and mission impact of Cyber incidents. Create a virtual environment where the research effort can determine critical system Cybersecurity functions. Once the functions are identified further research into a viable methodology for users to make effective evaluations of the platforms Cybersecurity status. The General Hosts (GHOSTS) framework would be used in conjunction with a test platform, e.g. LHA Machinery Control system (MCS) to generate accidental and purposeful operator actions triggering Cyber effects. Using the known Cyber effects and the user interface data on the targeted system, an evaluation of HMI available data will be gathered and summarized.

Benefits/Justification

Benefits of the project

- Improved Cyber incident recognition
- Accelerated incident resolution timeline
- Minimize Cyber Incident's impact to the platform
- Improve on False Positive Incident identification

Project Approach

High level statement of work

- System Virtualization
- Integration on Virtual Platform
- Scenario Generation
- Test
- Demonstration

Metric(s) of Success

- Delivery of System
- Operational Capability of Virtual Systems
- Anticipated effectiveness of scenarios created
- Actual effectiveness of scenarios tested
- Demonstration approval

Cost/Images/Relevant Information

- **Project Estimated Cost:** $ 150K
  - Development of a virtual system architecture
  - Configuration and integration of General Hosts (GHOSTS) Framework in the virtual environment
  - Scenario development and test
  - Demonstration and final report

Modern Shipbuilding Design Course 3

Project Lead Organization: SSI USA
Project Team members: Fincantieri Marinette Marine, Conrad

Concept/Idea

Issue: There aren't any marine-specific training opportunities that address marine design in general. There was a previous NSRP project to create this coursework but it's over 10 years old.

Proposed Solution(s): Update and document the Marine Design Course NSRP project results to use new software with latest updates and capabilities and document the results for anyone to deploy. Coordinate with learning centers to identify requirements to be able to offer the courses on site and determine what's involved to migrate the coursework to an Online Training Center.

Benefits/Justification

Benefits of the project

- Shipbuilding-specific designer course available
- On-line version of course
- All course material available on website (for teaching)
- Off-load costs to designers (less OJT required)

Project Approach

High level statement of work

- Update prior NSRP Modern Shipbuilding Design coursework
- Produce website with updated material
- Engage local training facilities
- Produce online training

Metric(s) of Success

- New material produced and published
- Website running w/ material
- Online training and/or local training being offered

Cost/Images/Relevant Information

- **Project Estimated Cost:** $150,000

Additional Projects

Questions and Discussion

Thank you!