Pacific Shipyards International (PSI), Port of Honolulu, Pier 24
AI/AR Knowledge Provisioning

PPPF Panel Presentation – March 24, 2021
Project Overview - Team

- Pacific Shipyards
- Conrad Shipyards
- Fincantieri Marine Systems, N.A.
- Auros Knowledge Systems
- D’Angelo Technologies
- Hepinstall Consulting Group

- NSRP Technical Manager
  - Jim House, ATI
- NSRP Project Technical Representative
  - Shawn Wilkerson, HII-Ingalls
Automate the provisioning of critical knowledge directly into the ship repair workflows using Artificial Intelligence (AI) and Augmented Reality (AR)
Value Proposition

- AI-assisted capture and packaging of critical knowledge/information
  - Customer requirements, Standards, Shipyard crowd-sourced knowledge
- Automated mapping of customer specifications and regulatory requirements into work control artifacts:
  - Estimating packages, Test and inspection plans, Planning work instructions, Job safety hazard notices, and Standard production work
- Augments ship repair workflow
  - Real-time viewing of reference materials while on ship
  - AR content persists for other users (Sticky Notes)
  - Virtual reference content (Designation nodes, animations)
  - Navigation feature assists in pathfinding to compartment
  - Remote Assistance feature provides live feedback from an SME via video chat
Applying AI and AR to Ship Repair

Project Knowledge Sources

Document Ingestor

Knowledge Packets

Auto-Classified Items

Knowledge Packets

Auto-Classified Items

Provisioned Knowledge
- Information is linked to ship compartments
- Navigation
- Remote Assistance
- Auros Connector
Accomplishments/Benefits to Date

✓ **Document Ingestor** Completed (Development Environment)

✓ **AI K-PAC Auto Classifier** / Categorization of Specs Completed (Development Environment)

✓ **6,516** Ship Repair Knowledge Packets

✓ Work Package imported and classified in **2 Days vs 21 Days**

✓ **8 Major Workflows** Completed or Under Development

✓ **AR User Interface** and **Auros Connector** functionality for compartment-specific information delivery completed

✓ Integrated the **Remote Assistance** capability to connect remote supervisor or subject matter expert to see and interact with worker at job site. (Especially useful during COVID).
Pilot Project Highlights - PSI

- Standard Work Capture
- Shared Workflow with Roles and Responsibilities identified
- Provisioned Knowledge is utilized and evaluated.
Other Pilot Project Highlights

• Conrad Shipyard - Customer Specification Compliance
• Fincantieri Marine Systems, NA (FMSNA)
  • Ship Service Generator Engines
  • Maintenance Procedures (Technical Manuals, Supplemental Procedures, Maintenance Repair Cards (MRC’s))
• Delaware River Barge Authority (DRBA)
  • Assessments to Track Repair Specifications Progress & Issues
Phase 2 Plans (Feb 2021 – Oct 2021)

- Conduct shipyard pilots
- Measure effectiveness
- Upgrade/harden the application for Ship Repair
- Release AI/AR Knowledge Provisioning Application for Ship Repair
- Develop Implementation Offerings
- Disseminate results to industry
Welding Smart Camera In-The Torch Project

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Team Introductions

- Pacific Shipyards
- Vigor Industrial
- EnergynTech
- D’Angelo Technologies
- Gatekey Engineering
- Hepinstall Consulting Group
- Miller Electric/Hobart Brothers

- NSRP Technical Manager
  - Mark Smitherman, ATI
- NSRP Project Technical Representative
  - Thresa Nelson, HII-NNS
Value Proposition

- Delivers a portable Smart Camera-Enabled Welding Torch System
  - Enables the welder to view the weld and welding parameters through the helmet without looking directly at the weld
  - Eliminates the need for mirror welding in inaccessible locations,
  - Significantly reduces eye injuries common across all shipyards,
  - Provide voltage and current information at point of use on the video screen during welding
  - Provides a digital recording of weld quality and process information to enable forensic analysis.

Provides a Welding Toolset for the “Next Generation” Shipyard Welding Workforce
SMART Camera in the Torch Prototype

• Torch Assembly

  Torch Handle
  • Trigger
  • Joystick

  Camera System
  • Camera In The Torch
  • Video Capture/Transmit

  Electronic Processing Module
  • External Wireless Communications
  • Software for Information Processing
Helmet/Headset Design Flip Up Screen

- Visor lifts, moving the screen, raspberry pi, and accessories out of the welder’s view.
- Screen flips up out of the way for easy access to inspect the weld.
- Visor easily lifts with no wear and tear on wires.
Shipyard Benefits

• Will significantly improve the ability of the welder to weld inaccessible areas shipboard and in the shop.
• Will improve the first-time quality of welding and reduce rework and repair.
• Will provide information to the shipyard quality department to improve quality and provide real-time quality feedback to the welders.
• Will be able to capture information to measure usage and demonstrate improvement in productivity and quality of “mirror” welding.
• Will significantly reduce eye injuries associated with welding (Target 50%).
Phase 2 Plans (Mar 2021 – Aug 2021)

- Perform Shipyard Testing
- Harden Camera-enabled Torch System for Shipboard Use
- Shipyard Implementations
- Develop Weld Procedure
- Commercialize Product for Industry Use
- Disseminate Results to Industry