

Simplified Precision Welding Technique

NSRP Project Manager: Ryan Schneider
NSRP PTR: Cody Whiteley

May 16, 2024



Overview

- Project team
- Project Overview and Progress to Date
- Schedule
- Deliverables
- Communication

Project Team

- EWI (prime)
 - Jim Hansen (PI), Tim Moore (Engineering support), Dennis Harwig (Senior Technical Leader)
 - Zane Bogosian (PM), Mark Schimming (VP Govt Business)
- ATI PM
 - Ryan Schneider
- NSRP Program Technical Representative (PTR)
 - Cody Whiteley
- Participant
 - HII-Ingalls – Jeffery Cook
 - NSWCCD – Kyle Lamone

Background

- Current semi-automatic tacking procedures frequently result in oversized tack welds when using FCAW or GMAW processes
 - Rework often necessary when welding over these oversized tacks
- Corrosion pits and scar repairs are also regularly over welded
 - Excess heat may damage coatings and cause distortion
- Semi-automatic GTAW has been demonstrated as a potentially viable method to tack fillets and repair corrosion pits
 - This work will take established data from ManTech project S2831 – Semi-Auto GTAW Weld Process coupled with information from the equipment supplier to establish parameters and demonstrate weld quality necessary for implementation

Goals

- Develop semi-automatic procedures for tacking and corrosion pit repair
- Design and produce a fixture to aid the operator in the tacking or repair operation
- Determine qualification requirements for the process and complete testing to display a pathway to implementation

Task 1 – Project Initiation and Kickoff Meeting:

- Initiate project – issue subcontracts
- Project kickoff meeting – discuss project, current tacking and pit repair best practices, and inspection requirements
 - Determine NSWCCD requirements for process and operator qualification
 - Determine positions for fillet weld tacking development
 - Discuss shipyard implementation requirements

Task 1 – Progress

- Plate sizes and quantities determined with Ingalls
 - Expectation is to have plate delivered within the next few weeks
- A qualification pathway has been discussed with NSWCCD and Ingalls
 - More information on the qualification pathway on Slide 8

Task 1 – Pathway to Qualification

- EWI will develop pit repair parameters in the flat, horizontal and overhead positions
 - Repairs will be validated by macrographs, microhardness tests and bend tests
 - The heat input for the repair will be recorded for each position
- To demonstrate the ability to qualify the process in the shipyard, a 0.5" thick groove will be welded in the vertical up position
 - The groove will be welded at a heat input that is representative of the pit repair procedures developed earlier in the project
 - The plate will be inspected to MIL-STD-271 and MIL-STD-2035A and inspected to Tech Pub 248 requirements
 - All weld metal tensiles, face and root bends, macroetch specimens as well as weld metal centerline and HAZ charpy v-notch tests will be analyzed

Task 2 – Development of Tacking and Corrosion Repair Parameters in Flat, Vertical and Overhead Positions

- Pit repair parameter sets will be developed in the flat, horizontal and overhead positions
- Fillet weld tacking procedures will be developed in the flat position in addition to other positions requested by the project team

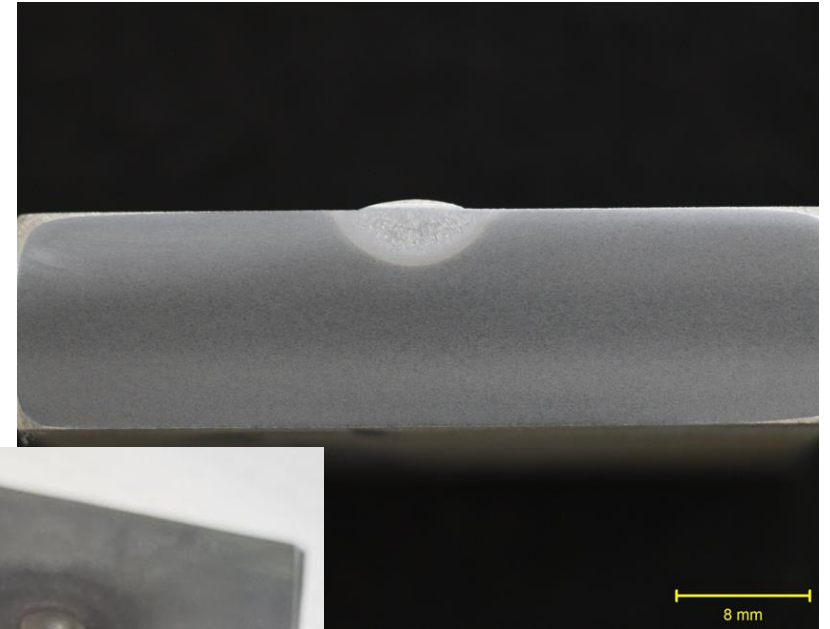
Task 2 – Progress

- The EWM TigSpeed system has been set up in EWI's Columbus laboratory and is ready for welding trials



Task 2 – Progress

- EWI completed preliminary research prior to submitting the proposal for this project
 - In the flat position parameters were developed resulting in complete fusion and minimal reinforcement
 - Reinforcement can be tailored by the amount of wire fed into the molten weld puddle



Task 3 – Fixture Development for GTAW Torch

- This task will develop an apparatus for the semi-automatic GTAW torch that will allow for use by a less experienced operator
 - With a torch fixture, the process will be able to operate more like a stud welder than a traditional welding torch
 - The TigSpeed system allows for one button control where the weld size can be set to accommodate the required tack or repair
 - The one button control removes the need for welder control with a traditional GTAW foot pedal



Task 4 – Shipyard Demonstration and Technology Transfer

- Host shipyard demonstration at HII – Ingalls in Pascagoula, MS
 - Demonstrate tacking and corrosion pit repair procedures
 - Review project results
 - Next steps to support implementation
 - Tech Transition
 - Procedures and data will be available to potential U.S. shipbuilding industry users
 - Progress reports will be made to NSRP Panels throughout the project
 - Project results will be documented in a final written report and disseminated via NSRP

Project Summary Schedule

Period of Performance: 2/21/24 – 2/20/25 (12 months)

Late Score	Task Name	% Complete	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	2025 Jan	Feb
<input type="checkbox"/>	2019-375-013 Simplified Precision Welding Technique	12%	[Gantt bar from Feb to Feb]												
<input type="checkbox"/>	Contract Award	100%	[Gantt bar from Feb to Feb]												
<input type="checkbox"/>	Reporting and Communication	17%	[Gantt bar from May to Oct]												
<input type="checkbox"/>	Task 1: Project Initiation and Kickoff	39%	[Gantt bar from Feb to Apr]												
<input type="checkbox"/>	Task 2: Development of Tacking and Corrosion Repair Parameters	0%	[Gantt bar from Jun to Sep]												
<input type="checkbox"/>	Task 3: Fixture Development for GTAW Torch	0%	[Gantt bar from Sep to Dec]												
<input type="checkbox"/>	Task 4: Shipyard Demonstration and Technology Transfer	0%	[Gantt bar from Nov to Feb]												

Today →

Project Deliverables

Period of Performance: 2/21/24 – 2/20/25 (12 months)

Deliverable	Due Date	Date Submitted
Project kick-off meeting	3/20/24	3/13/24
Quarterly Report #1	5/15/24	5/15/2024
Quarterly Report #2	8/9/24	
Quarterly Report #3	11/4/24	
Briefing at Spring Panel Meeting	TBD	
Final Report	2/20/25	

Project Communication

- Quarterly Project Team communication
 - Microsoft Teams
 - EWI to host and provide connectivity/call-in info
 - Proposed dates in table to right
 - Thursdays – can change as needed
 - Suggested time = 10:00 AM (EDT)
- Email EWI staff if any questions, concerns, request for updates, etc. at any time
 - Jim Hansen– jhansen@ewi.org
 - Zane Bogosian – zbogosian@ewi.org

Proposed Date	Event
5/16/24	Quarterly Telecon #1
8/15/24	Quarterly Telecon #2
11/7/24	Quarterly Telecon #3

Questions?

