Semi-Automatic Stud Welding Gun for Capacitor Discharge Stud Welding

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Proposed Project

- Hand held Capacitor Discharge (CD) Stud Welding systems are used to install millions of ¼" diameter and smaller CD studs to attach insulation and small components to bulkheads and decks on ships.
- Studs are manually loaded into the gun prior to being shot.
- This project is focused on designing and developing a prototype semi-automatic stud welding system.
- Team Members
  - Newport News Shipbuilding- Jon Sweeney, Stephanie Kiffer, Dan Moniak , Scott Grove , Elmer Dickens
  - Nelson Stud Welding- Nick Caratelli, Jonathan McDougall
  - Electric Boat- Vince Mangino
  - Ingalls Shipbuilding- Kevin Roossinck

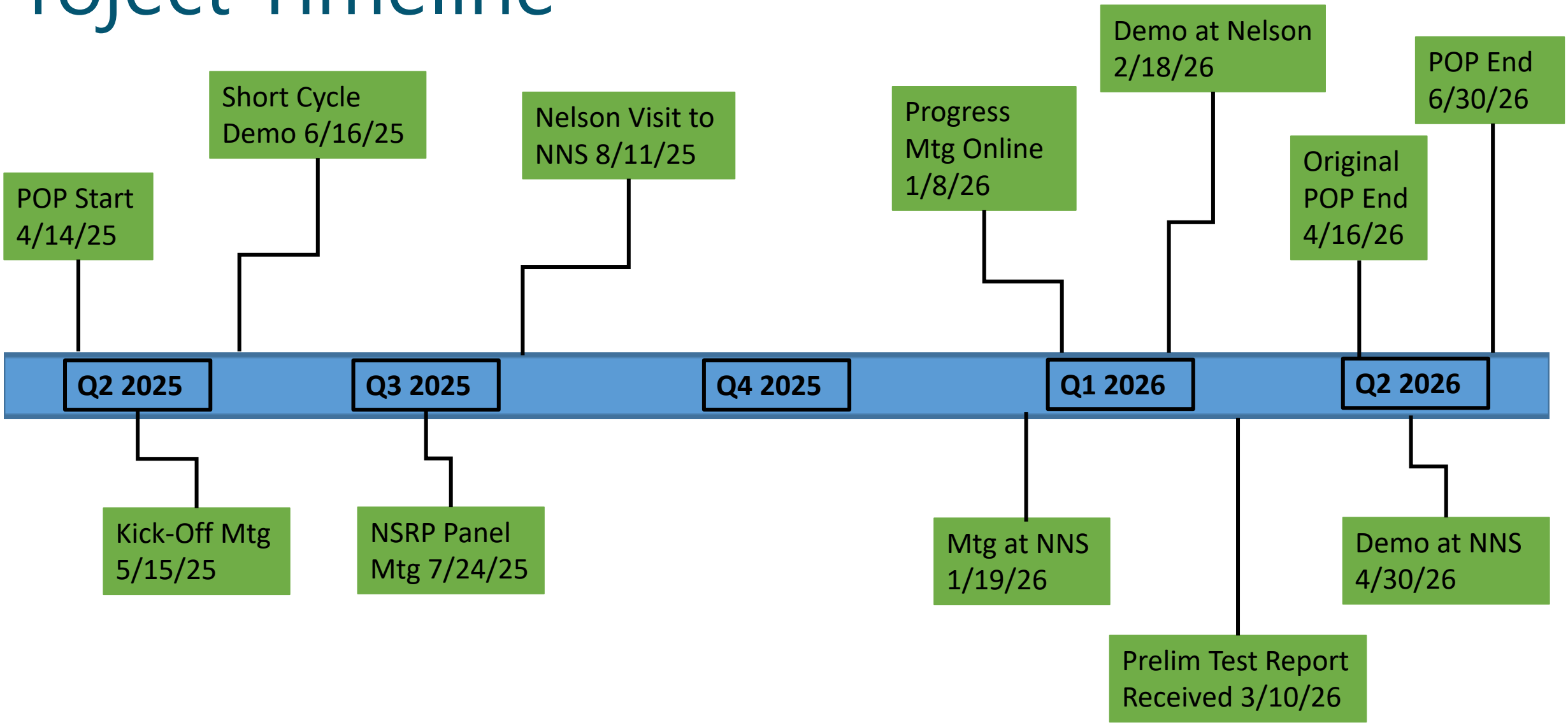
Project Objective

- To design, develop and test a prototype semi-automatic CD or drawn arc (DA) stud gun that is capable of housing and loading multiple studs without requiring operator intervention, utilizing a battery operated power source that is man portable.

Project Tasks

- Task 1-Team Members develop design concept for semi-automatic CD or DA stud gun, including loading system(ACD 8/11/2025)
- Task 2- Nelson Stud Welding to develop a prototype system at their facility (ACD 1/12/2026)
- Task 3- Nelson Stud Welding to perform welding testing to validate system meets NNS needs and specification requirements, including DT and NDT (ECD 5/22/2026)
- Task 4- Nelson Stud Welding to demonstrate systems capabilities for project team at their facility (ACD 2/18/2026)
- Task 5- Identify any required modifications to prototype system and report to Nelson Stud Welding (ACD 2/18/2026)
- Task 6- Shipyard demonstration of prototype system at NNS facility (ECD 4/30/2026)
- Task 7- Discuss tentative implementation plan for shipyards (ECD 5/22/2026)
- Task 8- Develop operator training plan and materials (ECD 5/30/2026)
- Task 9- Present final report, with recommendations, to NSRP Panel membership (Date TBD)

Project Timeline

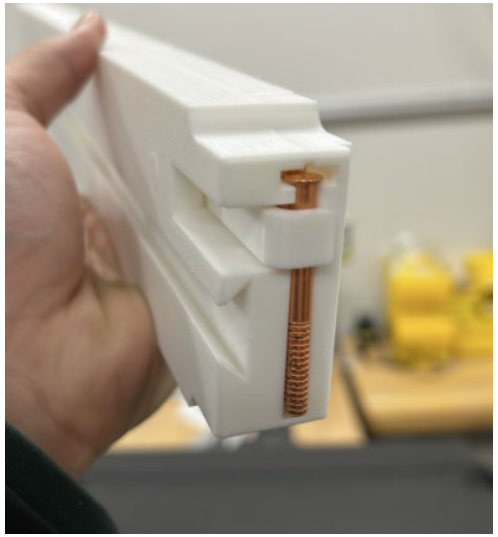


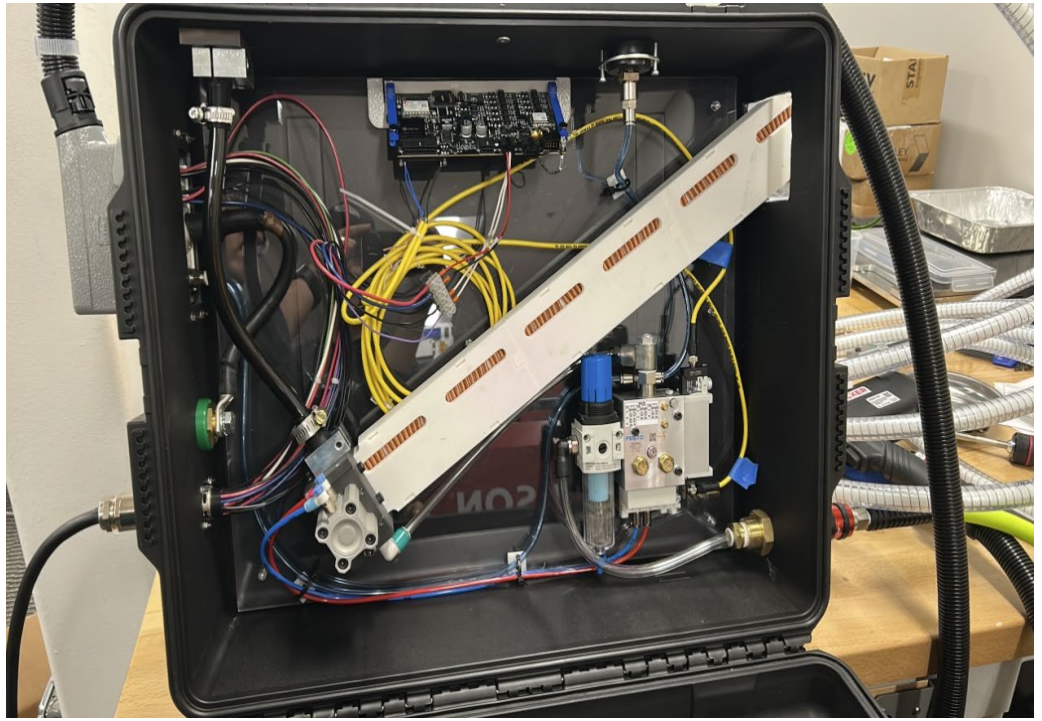
Task 1-Develop Design Concept ★

- Completed 8/11/2025
- Requirements:
  - Battery Powered Equipment (Nelson 900B)
  - Feeder Weight less than 50lbs. (suitcase)
  - Able to break system into pieces to maneuver onboard ships
  - Utilize shipboard air system to deliver studs to gun
  - Reusable cartridges for studs (up to 100 per cartridge)
  - One gun to accommodate both stud lengths

Task 2-Develop Prototype System★

- Completed 1/12/2026
- Discussion:
  - Nelson demonstrated servo gun at NNS (June 2025)
  - Final Review of prototype system (Jan 2026)



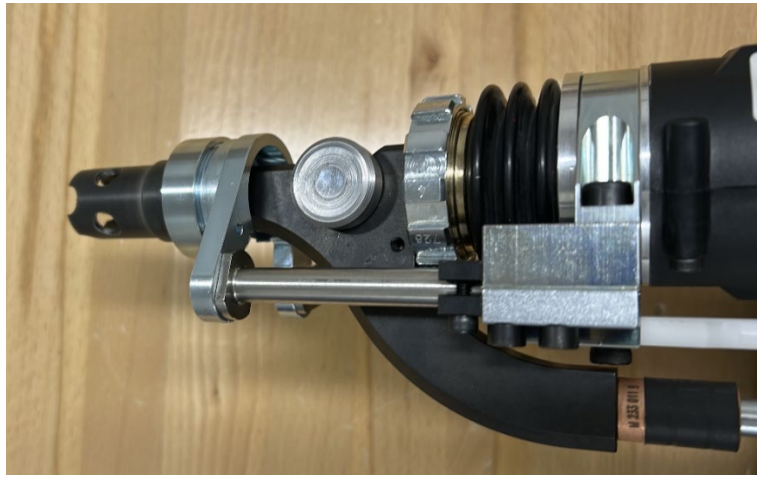


Task 4- Demonstration at Nelson ★

- Held in Elyria, Ohio (2/18/2026)
- Outcomes:
  - Representatives from NNS were able to operate system successfully
  - Insulation studs of 7/8" and 1-7/8" lengths were demonstrated
  - Experienced gun feed fault during rapid succession (Nelson evaluated, determined root cause is system "noise")

Task 3- Weld Testing the System ★

- In-Process (ECD 5/22/2026)
- Discussion:
  - Nelson-shot 1,200 studs and cycled 5,000 stud through cartridges
  - Provided preliminary test report to NNS on 4/24/2026
  - During testing Nelson experienced motor and gun board failures
    - Boards were replaced, work around is to plug feeder into 110V power



Task 6 – Shipyard Demonstration-NNS ★

- Completed 4/30/2026
  - Attendance included Nelson, Welding Engineering, Electrical and Installation Trades, Research & Development and NNS Engineering Management
  - Able to shoot stud of both lengths (7/8" and 1-7/8")
    - All passed VT and Bend testing
  - Initial feedback- stud gun is heavier than current CD Lite (Con), time savings and weld quality improvements could be substantial (Pro)

Proposed Prototype/Next Steps

- NNS to work with Nelson to complete Tasks 4,5,7 and 8
  - Nelson to finalize weld test report
  - NNS to provide list of required modifications to Nelson
  - NNS and Nelson to discuss Implementation Plan
  - NNS and Nelson to discuss Operator Training Plan
- NNS to complete Task 9 Final Report by 6/30/2026
- NNS to draft proposal for Phase 2 (FY2027) prototype funding
  - Complete development of production ready system
  - Evaluate system, complete production pilot and implementation

Budget

- Project budget $200,000.00
  - NNS: $49,805.00.00
  - Nelson: $150,000.00
- Spent to date:
  - NNS: 92% spent with ~$15,000.00 remaining as of 4/20/2026
  - Nelson: $150,000.00 Issued to Nelson

Demonstration/Wrap-Up

- Please direct your attention to the demonstration
- Questions or Comments?