Plug and Play Cobotics

NSRP Project Manager: Nick Laney
NSRP PTR: Patrick Cahill

June 20, 2024

Overview

- Project team
- Project Overview
- Schedule
- Deliverables
- Communication

Project Team

- EWI (prime)
  - Ryan Gneiting(PI), Tim Moore (Engineering support), Connie Reichert (PE)
  - Zane Bogosian (PM), Paul Blomquist (Senior Technical Advisor)
- ATI PM
  - Nick Laney
- NSRP Program Technical Representative (PTR)
  - Patrick Cahill
- Participant
  - HII-Ingalls – Jonathan Roberts
  - NSWCCD – James Thomas
  - RTT – Stephen Canfield

Background

• Cobot welding systems from integrators can cost in excess of $90K. That alone is a barrier to implementation for many shipyards. At the same time, integrated systems will often have welding equipment that is usually the preference of the integrator that shipyard workers may be unfamiliar with.

• This project addresses two problems that limit the adoption of automation, specifically cobots for use in shipbuilding:

- Typical cobot integrations are “vertical,” thus often adding welding equipment desired by the integrator, not allowing use of already installed equipment, and
- The proposed simplified approach reduces the cost and optimizes the already efficient skill set of shipyard mechanized welding equipment operators.

Goals

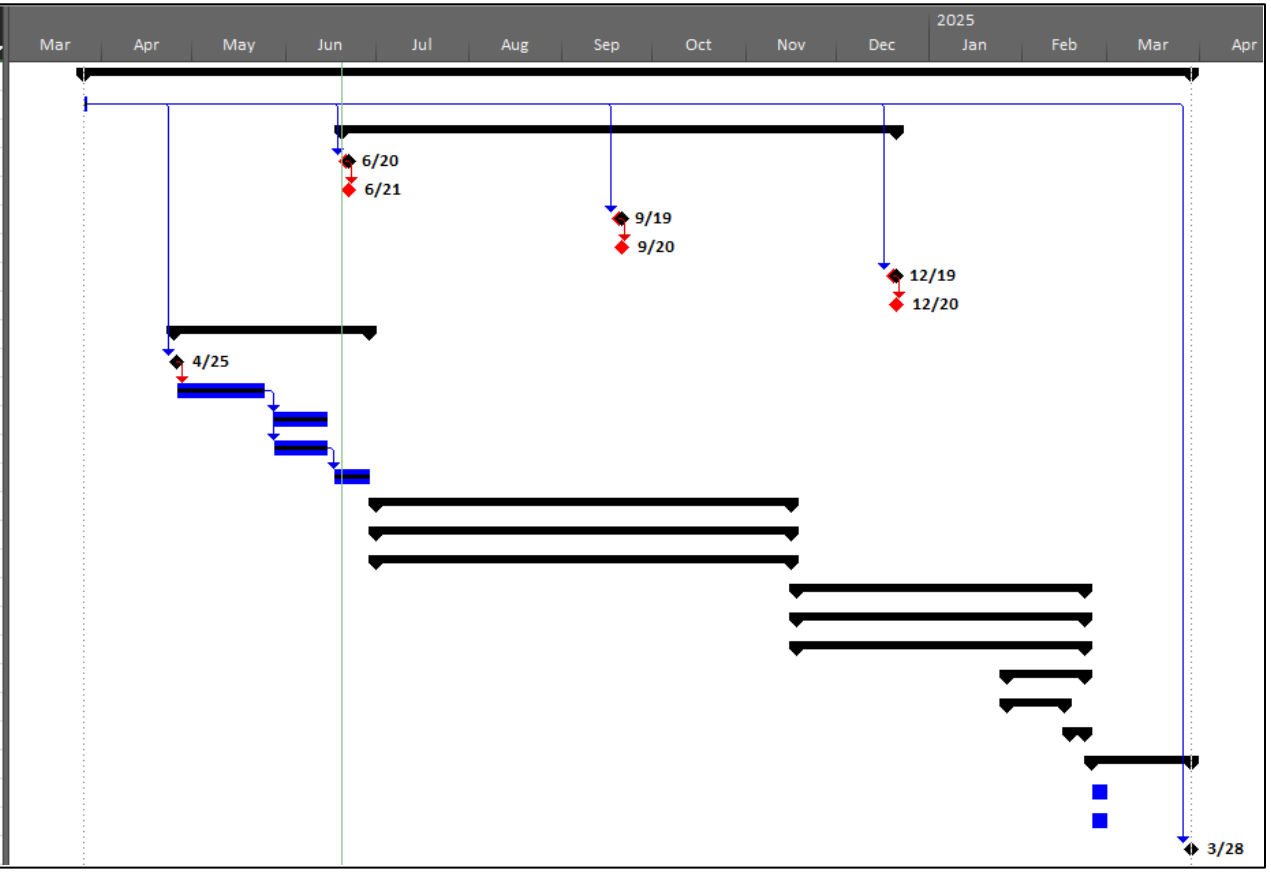
- Primary goal is to allow a shipyard to use a COBOT as a motion system that could be connected to the previously-installed base of welding power supplies at the shipyard. This will support a long term goal to help further spur adoption of automation technologies throughout the industrial base to satisfy production needs of a growing fleet.

- Demonstrate the use of a cobot as a general-purpose motion tool that is flexible enough to work with a variety of welding, and cutting equipment that is currently on site and used at shipyards.
  - Demonstrate ability to perform weld tasks through a simplified cobot interface
  - Demonstrate ability to perform metal cutting tasks

Project Summary Schedule

Period of Performance: 3/28/24 – 3/28/25 (12 months)

Late Score	Task Name	% Complete
	2019-375-014-PP-24-34 Plug and Play Cobotics	11%
	Contract Award	100%
	Reporting and Communication	25%
	Quarterly Review #1	100%
	Quarterly Report #1	50%
	Quarterly Review #2	0%
	Quarterly Report #2	0%
	Quarterly Review #3	0%
	Quarterly Report #3	0%
	Task 1 - Project Initiation and Kickoff Meeting	100%
	Kickoff Meeting (Virtual)	100%
	Team to identify candidate applications for each process	100%
	EWI to identify equipment for welding	100%
	RTT to identify equipment for cutting	100%
	Team to finalize work scope	100%
	Task 2 - Development of Plug-and-Play Cobotics Solution	8%
	EWI to develop weld process	5%
	RTT to develop cutting process	10%
	Task 3 - Test Plug-and-Play Cobotics Solution	0%
	EWI to test welding process	0%
	RTT to test cutting process	0%
	Task 4 - Demonstration	0%
	Ship systems and prepare for demonstration	0%
	Demonstration at Ingalls	0%
	Task 5 - Technology Transfer and Reporting	0%
	EWI to deliver welding cobot programs, communication hardware, mounting solutions, and training documentation	0%
	RTT to deliver cutting cobot programs, communication hardware, mounting solutions, and training documentation	0%
	EWI to create and submit Final Report to NSRP	0%



Task 1 – Project Initiation and Kickoff Meeting:

- 1.1 Meet with team members
  - Status: Complete
  - Identify candidate applications for each process
    - Weld:
      - T-Fillet Weld - Groove Weld 1" thick
      - Material Group S1
      - Wire: 0.052" E71T-1
      - Shielding: 100% CO2
      - Nice to have Weave and Multi-pass capabilities
    - Cutting:
      - 1/4 -1/2" thick plate cutting
  - Identify equipment for each process
    - Weld:
      - Miller with Arc Reach Feeder at Ingalls, Miller Continuum 500 at EWI
      - Torch Tregaskiss robotic torch from Ingalls
    - Cutting
      - Hypertherm 125 amp at Ingalls, Miller at RTT
- 1.2 Finalize project work scope with team
  - Status: Complete

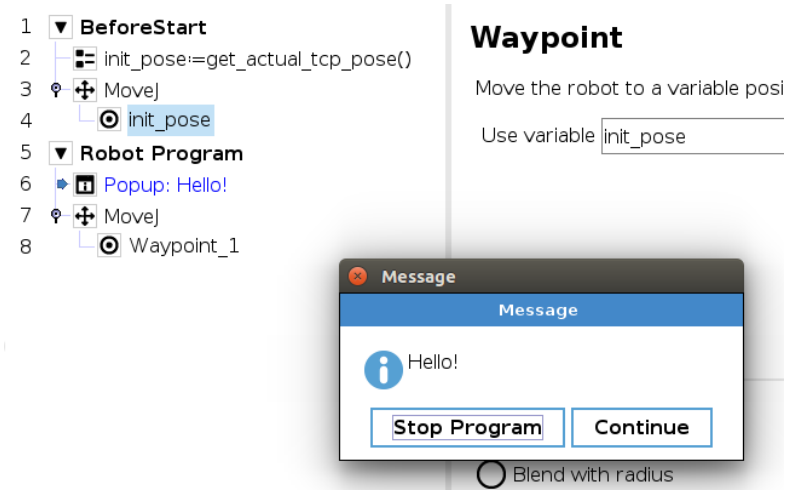
Task 2 – Development of Plug-and-Play Cobotics solution

- 2.1 Develop simplified path planning and for starting and stopping each process
  - Status:
    - Weld: Start in July
    - Cutting: In process
- 2.2 Develop communication hardware required to interface with processing equipment
  - Status:
    - Weld: Start in July
    - Cutting: In process
- 2.3 Develop cobot mounting solution to secure cobot in work area
  - Status:
    - Weld: In process
    - Cutting: In process
- 2.4 Develop end effector mounting solution for each process
  - Status:
    - Weld: In process
    - Cutting: In process

Task 2 – Development of Plug-and-Play Cobotics solution

- 2.1 Weld: Develop simplified path planning and for starting and stopping each process

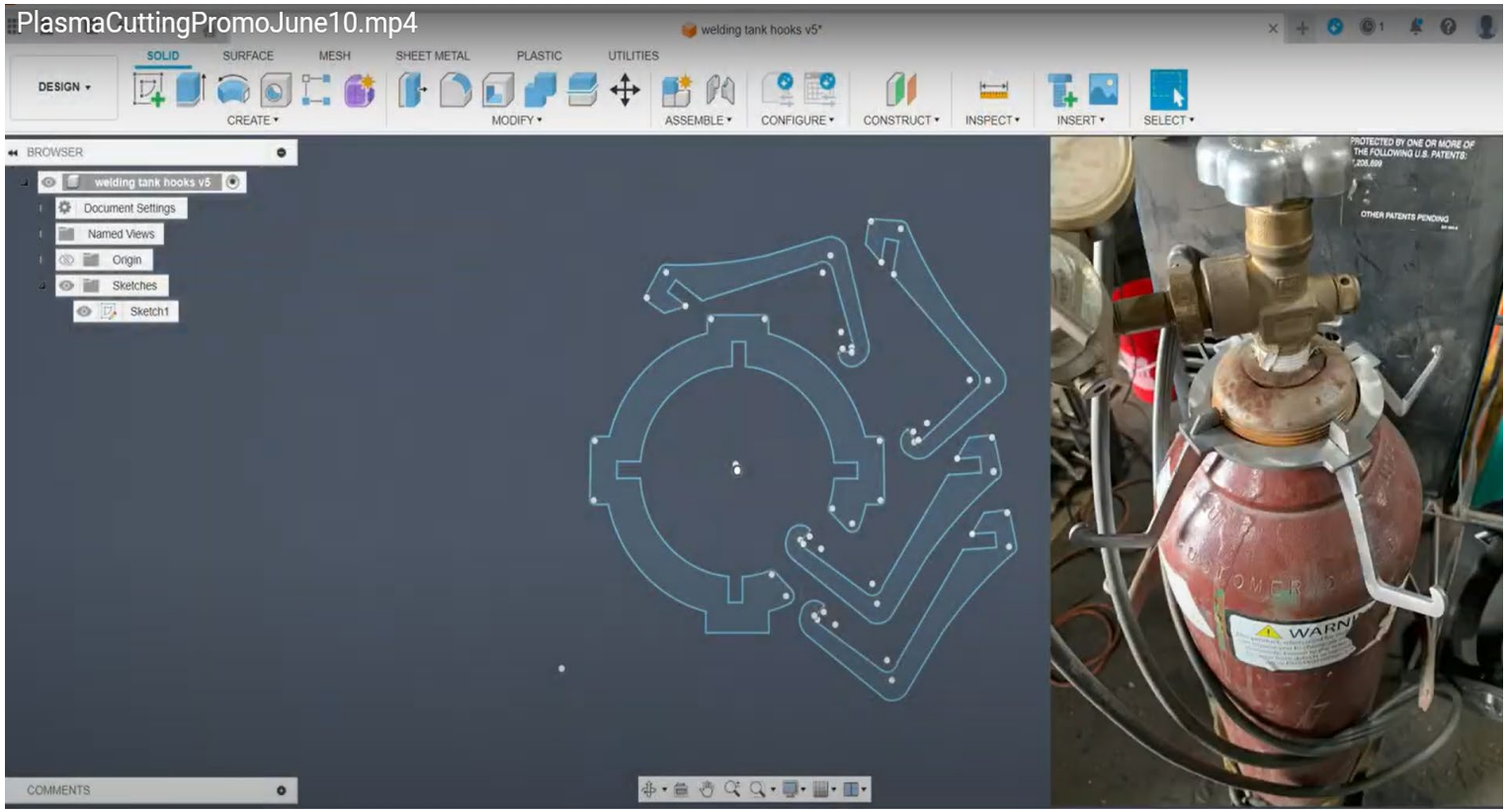
- Start work in July



Task 2 – Development of Plug-and-Play Cobotics solution

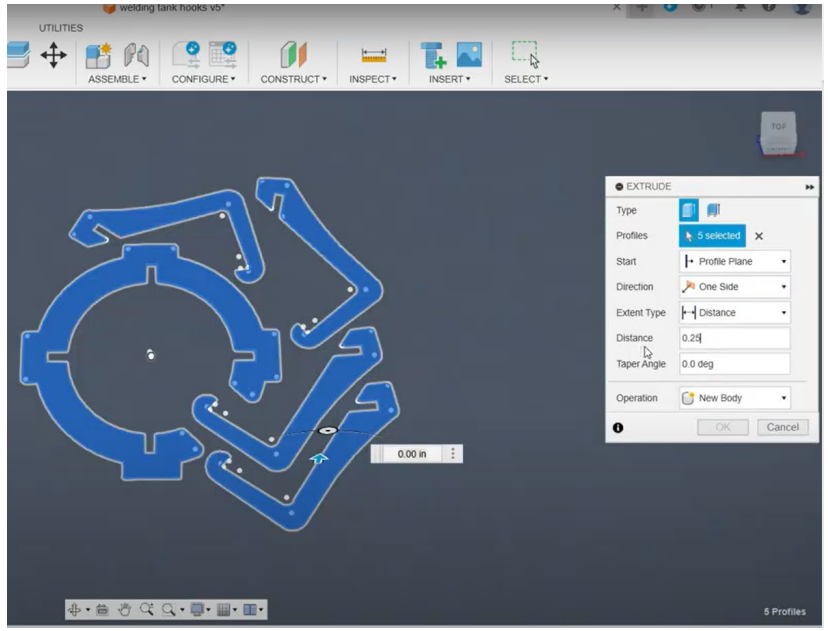
- 2.1 Cutting: Develop simplified path planning and for starting and stopping each process

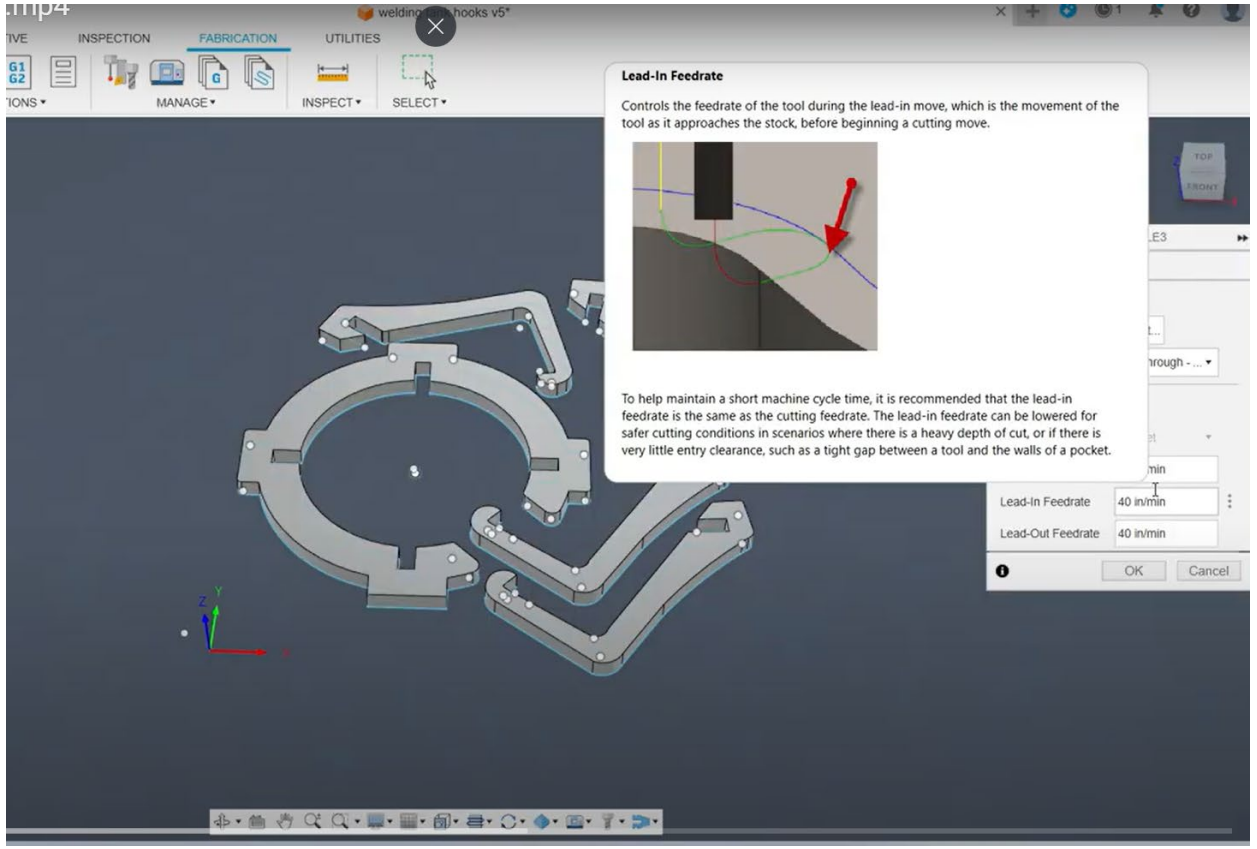
- Fusion 360 used to setup
- RTT also working on a simple shape library



Task 2 – Development of Plug-and-Play Cobotics solution

- 2.1 Cutting: Develop simplified path planning and for starting and stopping each process
- Import parts, extrude, define bevel and other parameters

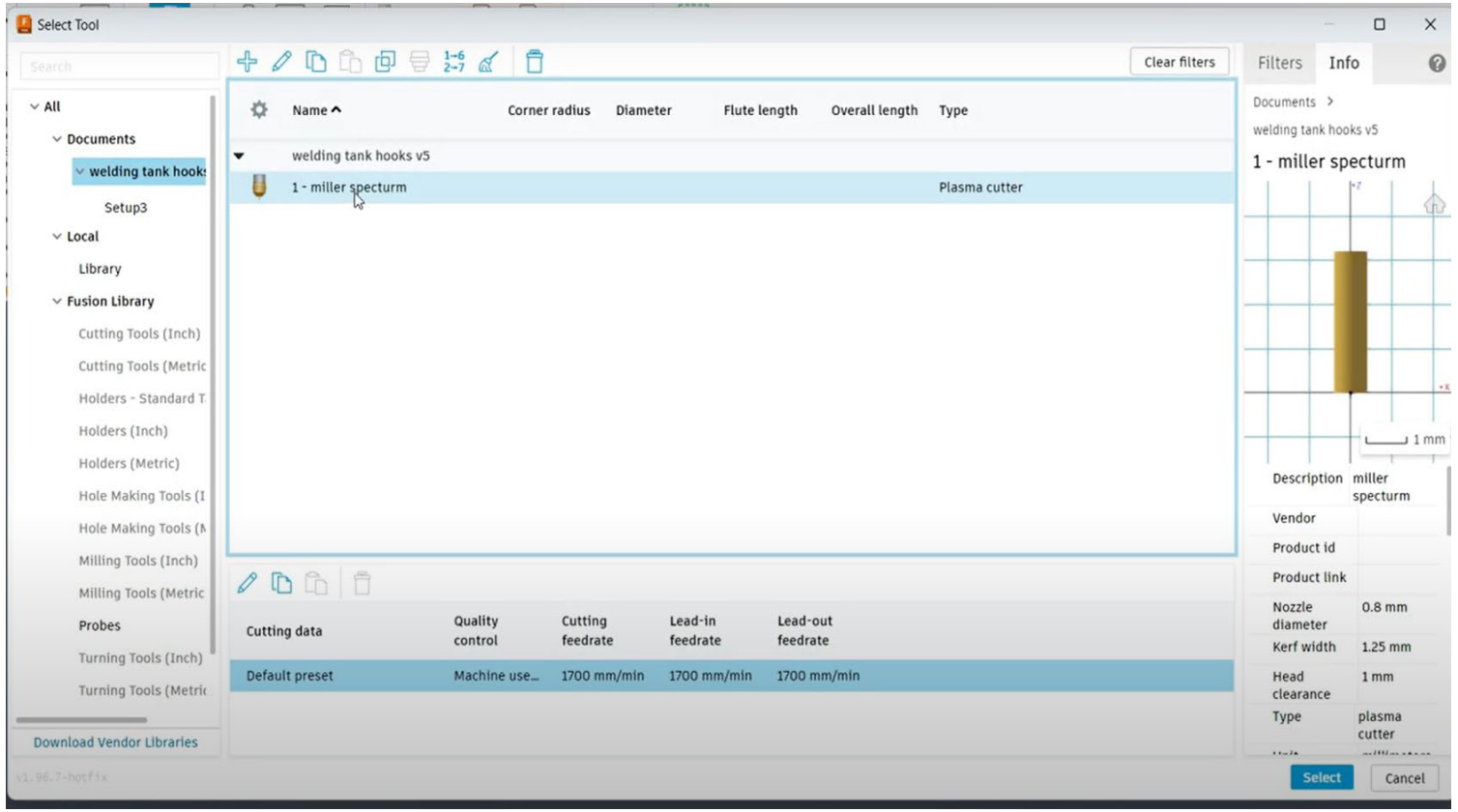




Task 2 – Development of Plug-and-Play Cobotics solution

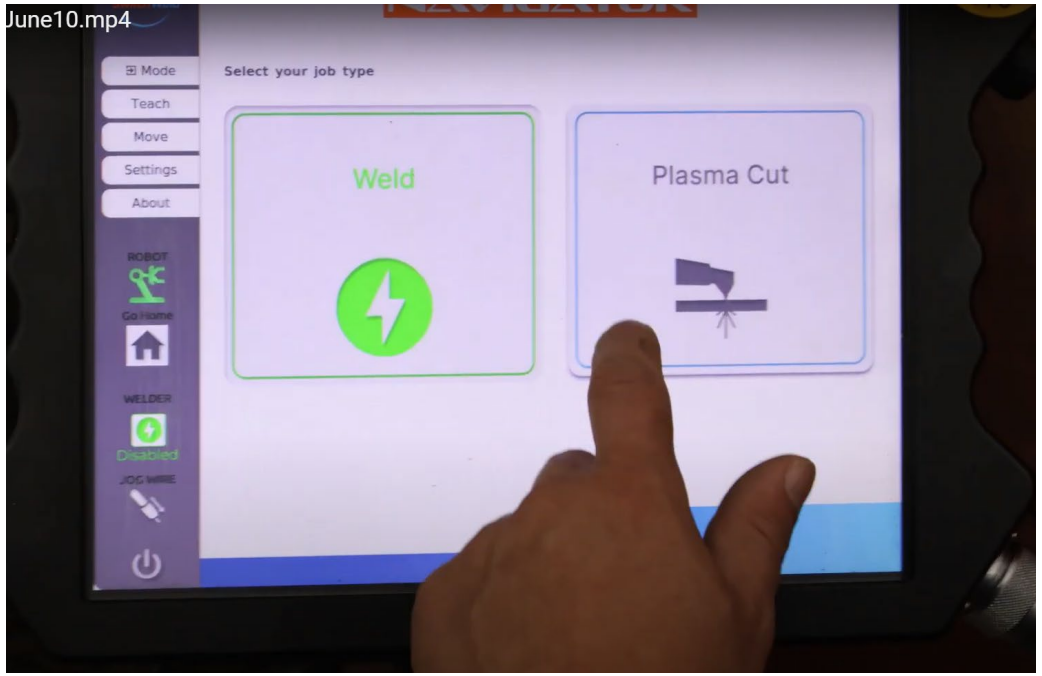
- 2.1 Cutting: Develop simplified path planning and for starting and stopping each process

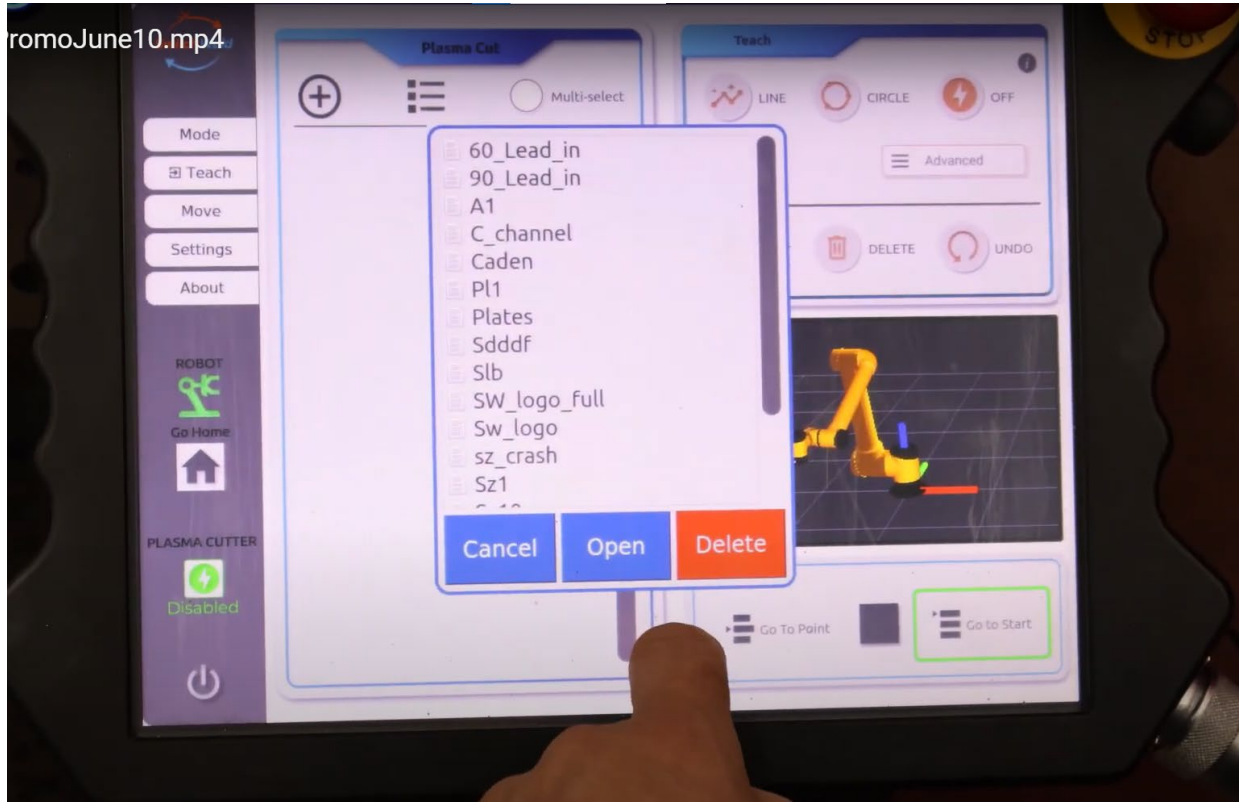
  - Select Plasma Cutter



Task 2 – Development of Plug-and-Play Cobotics solution

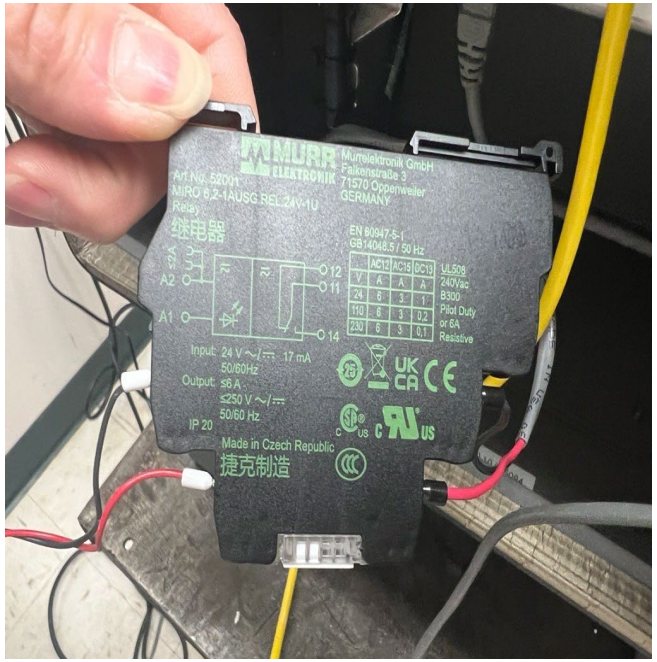
- 2.1 Cutting: Develop simplified path planning and for starting and stopping each process
  - Select process and import





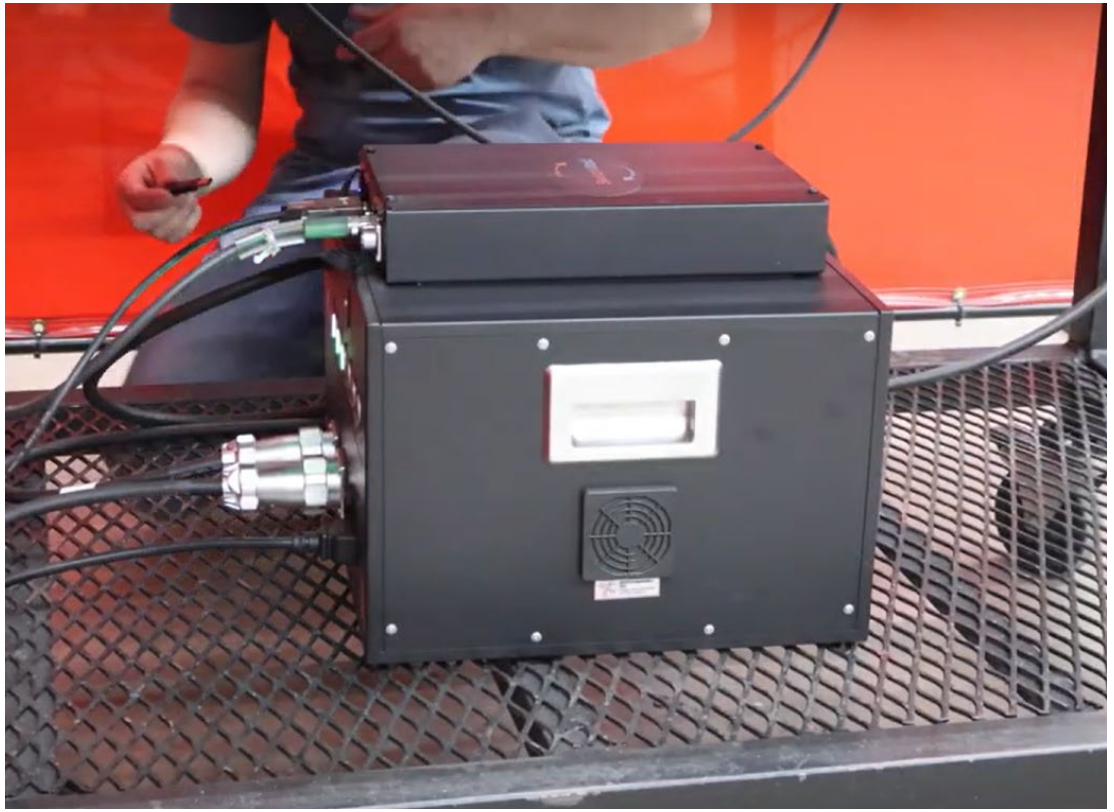
Task 2 – Development of Plug-and-Play Cobotics solution

- 2.2 Weld: Develop communication hardware required to interface with processing equipment



Task 2 – Development of Plug-and-Play Cobotics solution

- 2.2 Cutting: Develop communication hardware required to interface with processing equipment

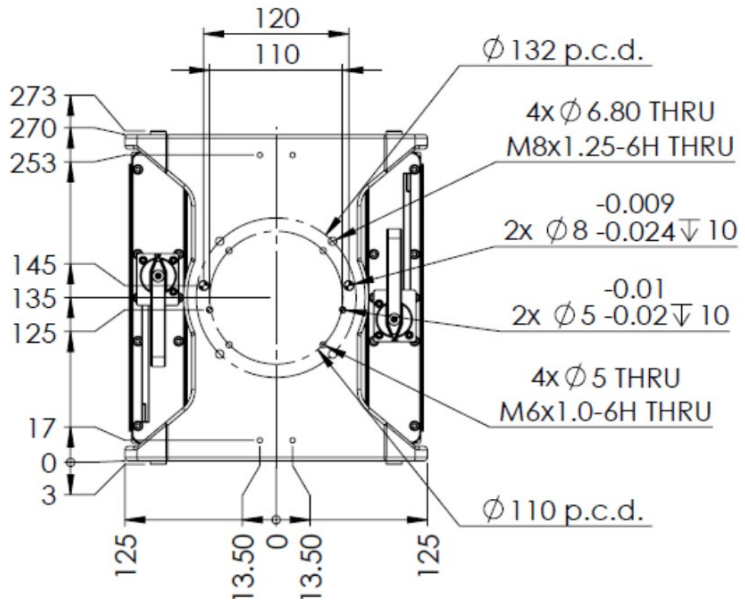


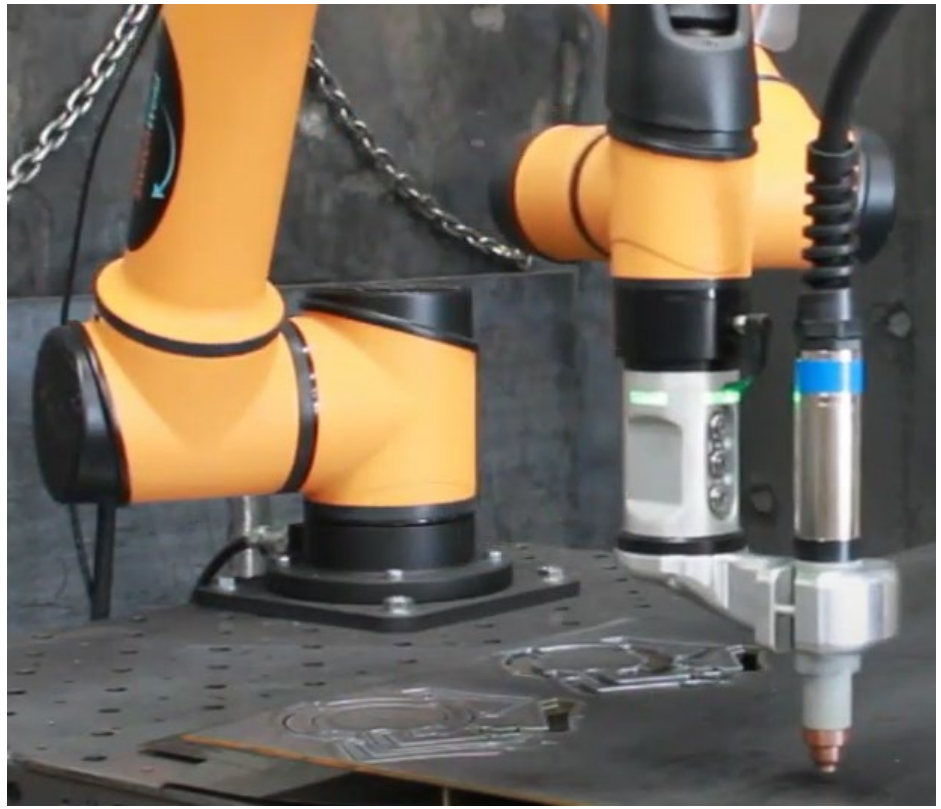
Task 2 – Development of Plug-and-Play Cobotics solution

- 2.3 Develop cobot mounting solution to secure cobot in work area
  - Need to purchase Magwitch $1,557

magswitch®

Generic Dimensions (featuring UR3/UR3e/UR5/UR5e pattern)





Task 2 – Development of Plug-and-Play Cobotics solution

- 2.4 Develop end effector mounting solution for each process
  - Weld: Tregaskiss robotic torch from Ingalls, with SwitchWeld Navigator Puck

Task 3 – Test Plug-and-Play Cobotics Solution

- Setup and test mock applications for each process
  - EWI to test welding application
  - RTT to test cutting application
  - Status:
    - Weld: Start November
    - Cutting: Start November
- Develop operator training and qualification requirements
  - Training
  - Qualification:
    - Weld: NAVSEA 248 Mechanized Level II
    - Cutting: MIL-STD-1689A , AWS C4.1 sample 2 or better
  - Status:
    - Weld: Start November
    - Cutting: Start November

Task 4 – Shipyard Demonstration

- Ingalls to demonstrate welding solution
  - Status: January-February

- RTT to demonstrate cutting solution
  - Status: January-February

Task 5 – Technology Transfer and Reporting

- Deliver cobot programs, communication hardware, and mounting solutions
  - Status: February
- Deliver training documentation on how to setup and use solution
  - Status: February
- Deliver final report to NSRP Panel
  - Status: February

Project Deliverables

Period of Performance: 3/28/24 – 3/28/25 (12 months)

Deliverable	Due Date	Date Submitted
Project kick-off meeting	4/25/24	4/25/24
Quarterly Report #1	6/24/24	
Quarterly Report #2	9/22/24	
Quarterly Report #3	12/21/24	
Briefing at Spring Panel Meeting	TBD	
Final Report	3/28/25	

Project Communication

- Quarterly Project Team communication
  - Microsoft Teams
    - EWI to host and provide connectivity/call-in info
  - Proposed dates in table to right
    - Next telecon = Thursday, September 19 @ 10:00am (EDT)
- Email EWI staff if any questions, concerns, request for updates, etc. at any time
  - Ryan Gneiting– rgneiting@ewi.org
  - Zane Bogosian – zbogosian@ewi.org

	Proposed Date	Event
✓	6-20-24	Quarterly Telecon #1
	9-19-24	Quarterly Telecon #2
	12-19-24	Quarterly Telecon #3

Questions?