



Portable Cold Spray Repair System

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Objective:

- Develop a multifunctional end effector system that can be integrated with several different robots to enable the Navy to more efficiently perform shipboard repairs

Vision:

- Design, fabricate and deploy a multifunctional end effector system that can be quickly adapted to several different repair technologies and integrated with a robots that are used by the US Navy

Approach:

- Use commercial off-the-shelf technologies (COTS) where possible for mapping, surface preparation, repair, inspection and machining/finishing
- Use COTS quick disconnects
- Existing technologies and technologies under development such as scanning, plasma blast, laser ablation, portable cold spray and ultrasonic/ eddy current inspection
- Develop prototype integrated control system for the selected technologies
- Common power supply, control computer and gas supply
- Demonstrate technology in a shipyard



Portable Robot

- Robotic Technologies of Tennessee (RTT)
- Magnetic track portable robot
- Developed for welding
- LIDAR surface scanner

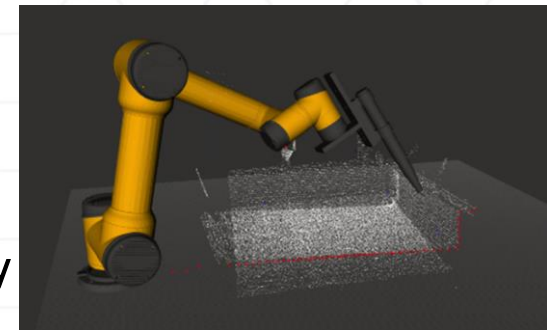


Quick Disconnects for hardware (PSU/ARL)

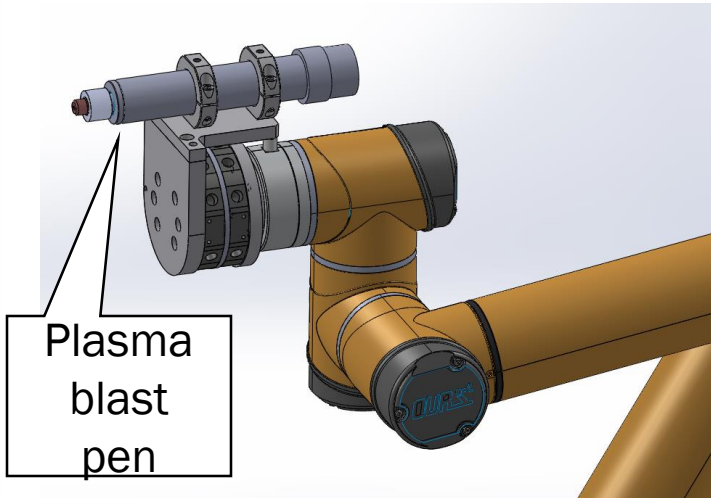
- Designed and demonstrated connectors for:
 - LIDAR scanning for workspace mapping
 - Plasma blast coating removal
 - Grinding surface preparation
 - Cold spray surface repair

Common Power Supply

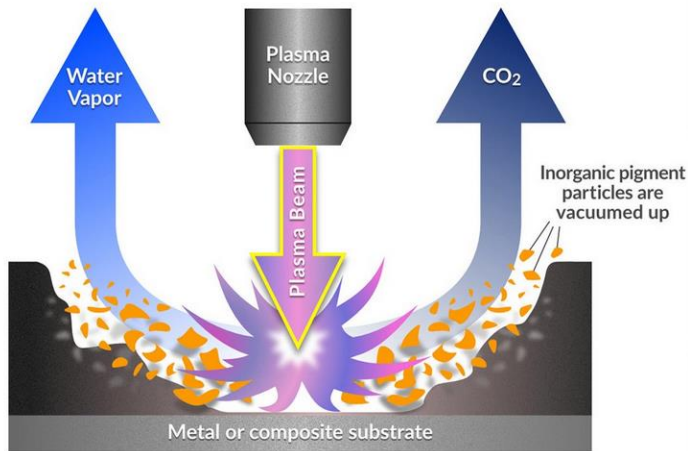
- Designed and fabricated a common power supply
- Only need one power cable



RTT example of LIDAR scan
Produces Point Cloud



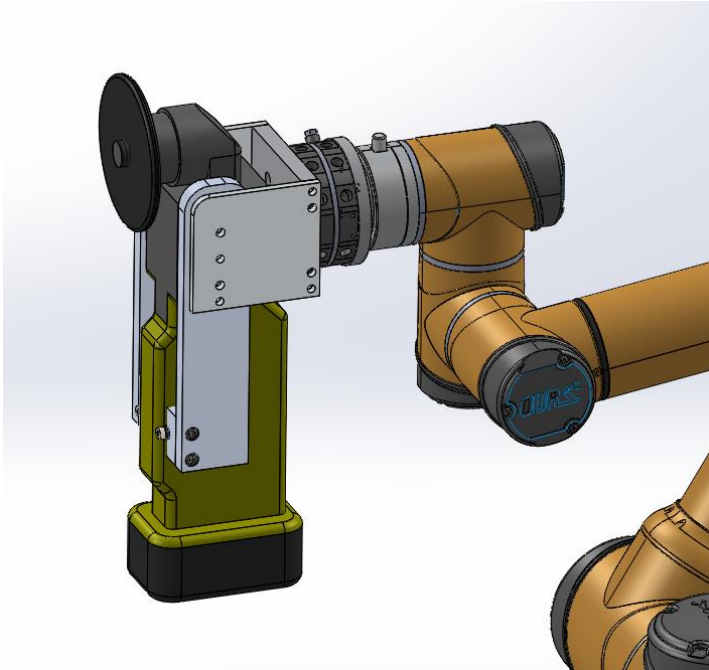
- Partnering with Atmospheric Plasma Solutions
- Plasma blast removes coatings without the use of abrasive media or chemicals
- Utilities: Requires only compressed air and 240VAC power



Plasma
blast
pen

<https://apsplasma.com/coating-removal/>

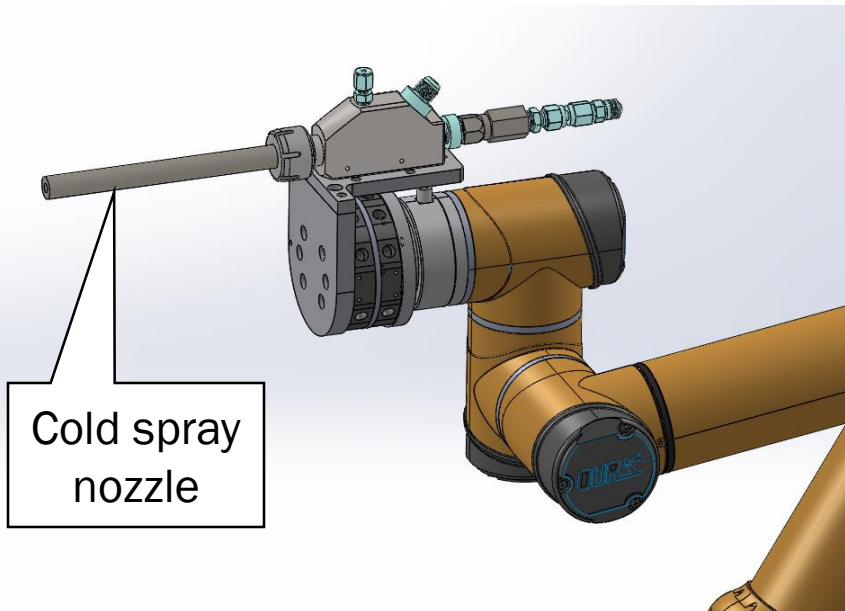
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- GI Squared Rotation Activated Grinder to be used for additional surface preparation
- Uses COTS battery powered grinder, modified by GI Squared to be turned on/off by robotic wrist motion
- No electrical connection to robot required

GI² cordless grind attached to the robot

- Partnering with VRC Metal Systems for cold spray application
- PSU and RTT have established relationships working with VRC on past projects



Previous robotic cold spray application completed by RTT



- Developing support technologies
- Working on robot programming to support repair technologies
- Looking at additional equipment
- Designing support equipment
 - Gas Supply
 - Utilities
 - Common power supply
- Looking for input