

Transition of Power Tool Optimization

NSRP SPC Panel Meeting
September 2023



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Project Management and Execution

Extended Team

Provide Technical Oversight (PTR)

Assist with Technology Transfer and Implementation

Participation in Project Review Meetings

Project Team

Perform Technical Work;
Complete Deliverables

Coordinate/Lead Technology Transfer and Implementation

Conduct Project Review Meetings

ATI

Ensure Project is on Schedule, Within Budget, Provide Contractual Oversight

Assist with Technology Transfer

Participate in Project Review Meetings

Scope of Work

- Use findings from previous NSRP project “Optimization of Power Tool Surface Preparation” to implement better practices while using a combination of power tools during surface preparation
- Goals/Objectives
 - Implement better practices for power tool usage
 - Distribute novel combinations of tools to achieve various levels of cleanliness
 - Instruct shipyard personnel and demonstrate where multiple tools can be more productive during ship maintenance
 - Transition data, guidance, and techniques learned in “Optimization of Power Tool Surface Preparation” to shipyard for implementation

Tasks

- Assemble Stakeholder Team and Establish Scope
 - Define overall scope and how to implement better power tool practices
- Distribute Visual Aids and Guidance
 - Utilize photos and data from previous work for field guidance and visual aids
- Shipyard Instruction and Demonstration
 - Visit shipyards and provide on-site instruction with various power tools. Use feedback to update visual aids and guidance.
- Publish and Distribute Final Training Documents

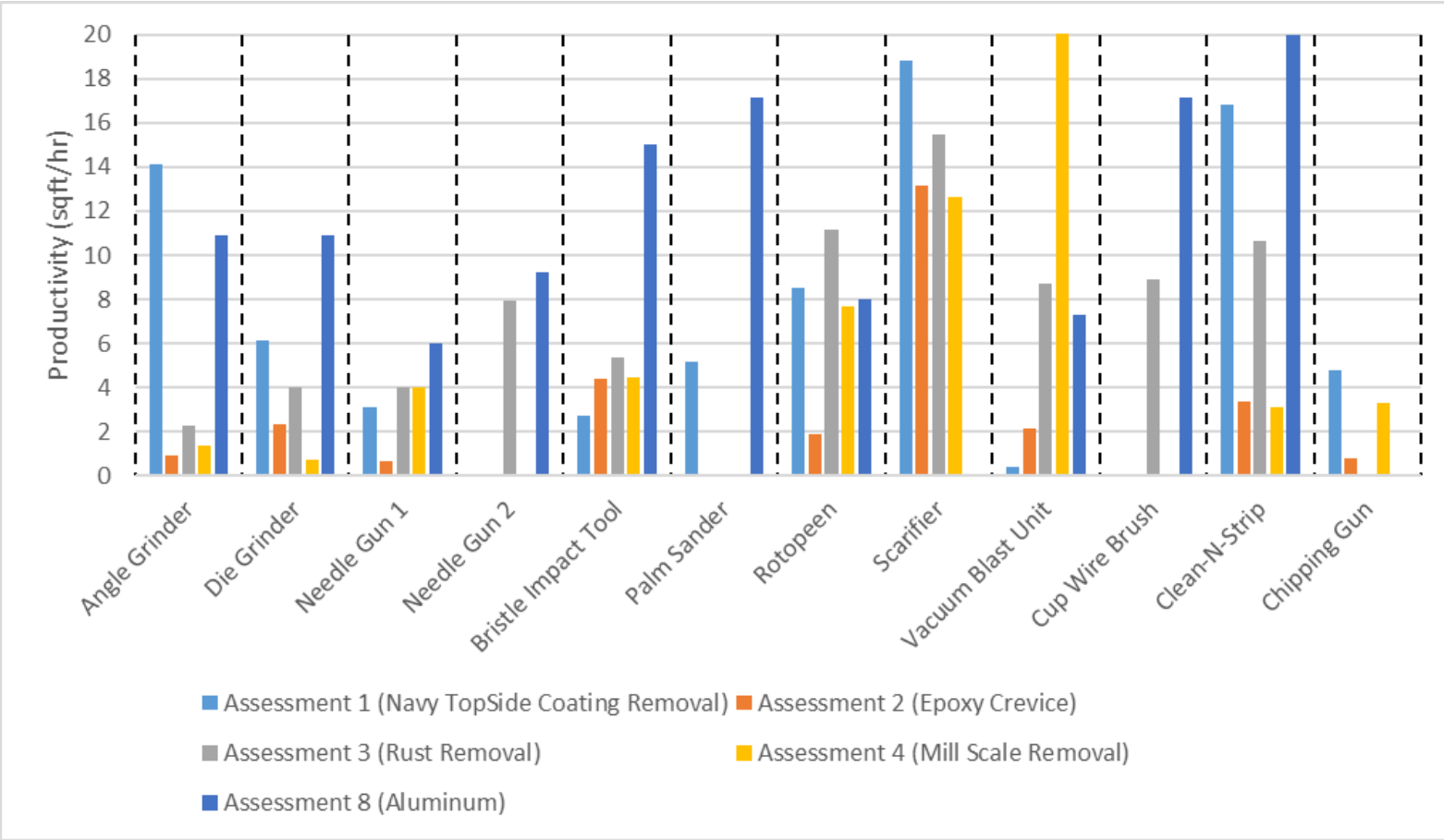
Schedule

- Draft novel combination and instructions for power tool areas
 - Provided at Briefing at Panel Meeting
- Provide guidance document to
 - HII NNS & Fincantieri & Nassco
 - Final Draft August
- Shipyard visit after 1+ months of using procedure guidance
 - Nassco
 - August (3 days on site at each yard)

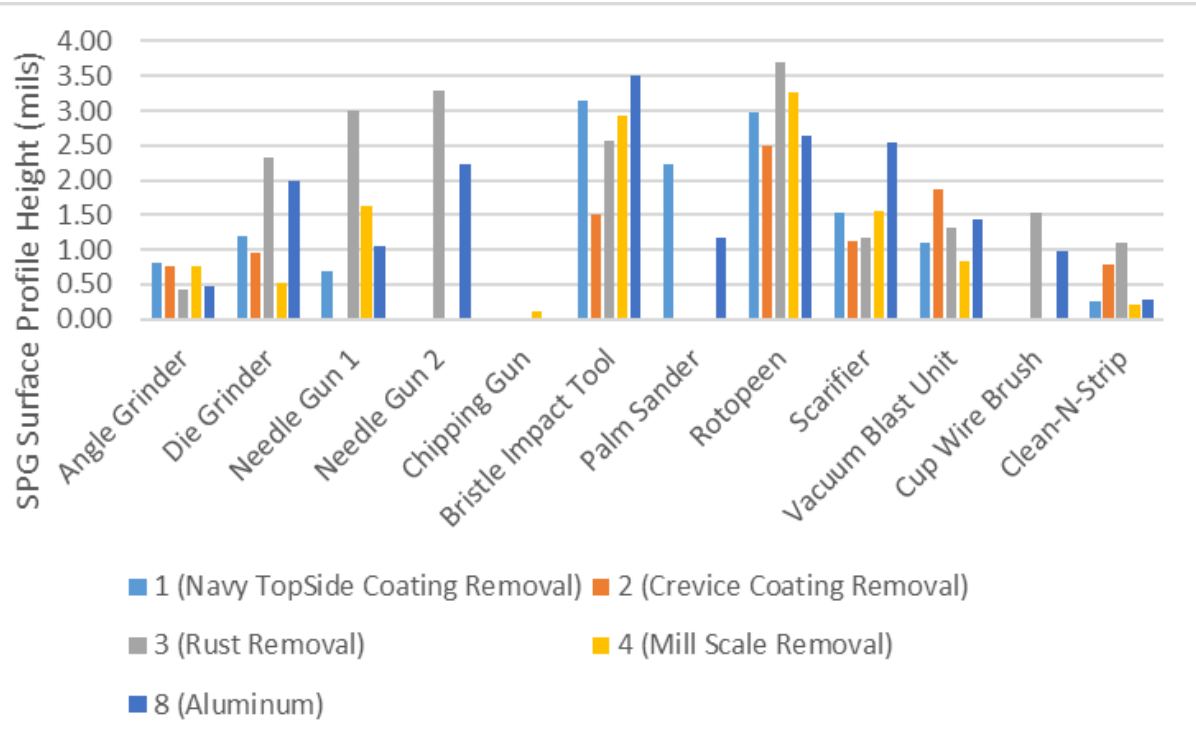
Deliverable	Due Date
Project Plan & Schedule	1/15/2023
Briefing at Panel Meeting	March 2023
Visual Aids and Guidance Document	5/15/2023
Summary of Feedback from Shipyard Personnel	6/30/2023
Final Report with Recommendations	8/15/2023 (Extended 9/30/2023)

Optimization of Power Tool Surface Preparation (2019 NSRP Project)

- Tools vary in performance depending on the surface being prepared or coating being removed
- For a given task, some tools are more applicable than others



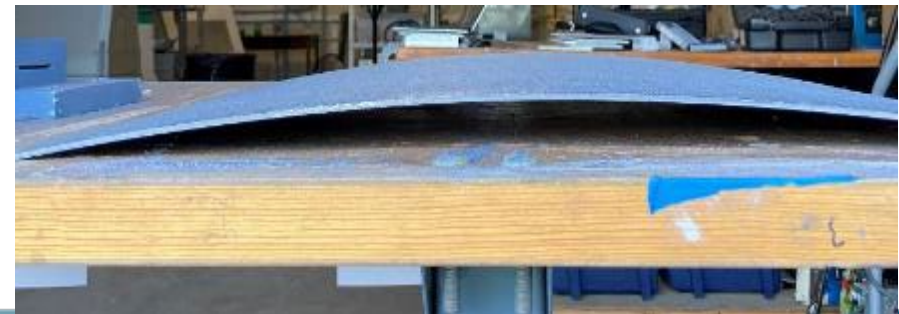
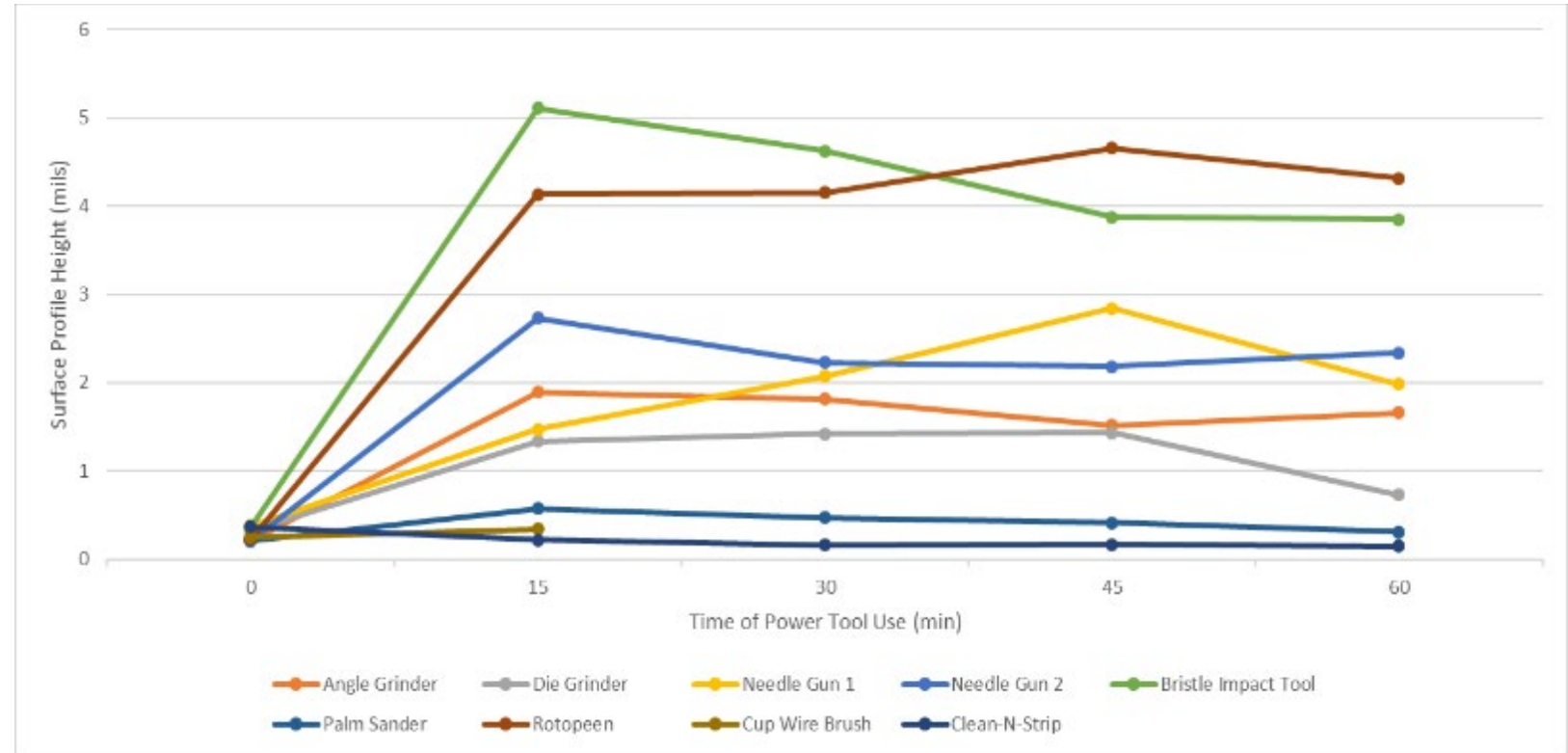
Previous Studies (cont'd)



- Surface Profiles can vary greatly from tool to tool and from substrate to substrate.
- Important to consider these differences and effects when selecting a tool to achieve a target surface profile.

Previous Studies (cont'd)

- No real change in surface profile over time seen
- Tools will warp metal instead of creating a greater profile
- Scarifiers found to remove metal after extended exposure



Guide Example: Navy Topside Coating on Flat Steel



Navy Topside		
Productivity		
Tool	Tool Productivity (ft ² /hr)	Cleanliness Level
Scarifier (4")	18.82	SP-11
Clean-N-Strip (4.5")	16.84	SP-11
Angle Grinder (5")	14.10	SP-11
Rotopeen (4")	8.51	SP-11
Die Grinder (3")	6.15	SP-11
Palm Sander (6")	5.19	SP-11
Chipping Gun	4.79	SP-3
Needle Gun Inline	3.08	SP-15
Bristle Impact tool	2.70	SP-11
Portable Vacuum Blast Unit	0.41	SP-11

Additional information:

- Tool that were **not able** to reach SP-11
 - *Chipper Gun*
 - *Needle gun Inline*
- A Combination of different tools can be used to reach the user desired results
(*Remove Topside Coat*) + (*Create Surface Profile*)
 - Ex: *Clean-N-Strip + Bristle Impact Tool*
 - Other combinations of tools can also be used to reach SP-11

Navy Topside		
Surface profile		
Tool	Avg Surface Profile (Testex Mils)	Avg Surface Profile (SPG Mils)
Bristle Impact tool	3.9	3.134
Rotopeen (4")	3.05	2.97
Portable Vacuum Blast Unit	2	1.09
Scarifier (4")	1.9	1.52
Die Grinder (3")	1.75	1.19
Palm Sander (6")	1.5	2.23
Needle Gun Inline	1.5	0.69
Angle Grinder (5")	1.15	0.81
Clean-N-Strip (4.5")	1.05	0.26

Guide Example: Flat Aluminum (bare surface)



Aluminum	
Productivity	
Tool	Tool Productivity (ft ² /hr)
Clean-N-Strip (4.5")	20
Palm Sander (6")	17.14
Cup Wire Brush (4.5")	17.14
Bristle Impact tool	15
Die Grinder (3")	10.91
Angle Grinder (5")	10.91
Needle Gun Pistol Grip	9.23
Rotapeen (4")	8.00
Portable Vacuum Blast Unit	7.32
Needle Gun Inline	6.00

Additional info:

- Aluminum
 - 5054 Alloy
- Tool that were **not able** to create a significant Surface Profile
 - Clean-N-Strip*
- Tools that **damaged**/resulted in **metal loss** of the Aluminum panel
 - Scarifier*
- The goal of the test was to create a visual SP-11 Finish
 - Some tools could reach deep profile if operated longer, but also risked damaging the substrate

Aluminum		
Surface profile		
Tool	Avg Surface Profile (Testex Mils)	Avg Surface Profile (SPG Mils)
Bristle Impact tool	4.65	3.507
Rotapeen (4")	4.15	2.65
Needle Gun Pistol Grip	3.25	2.24
Needle Gun Inline	2.3	1.06
Die Grinder (3")	2.225	1.99
Palm Sander (6")	1.7	1.16
Portable Vacuum Blast Unit	1.25	1.44
Angle Grinder (5")	1.2	0.48
Clean-N-Strip (4.5")	1.1	0.28
Cup Wire Brush (4.5")	1.05	0.98

Guide Example: Rust (Grade C) on Flat Steel



Rust Grade C		
Productivity		
Tool	Tool Productivity (ft ² /hr)	Cleanliness Level
Rotopeen (2")	16.27	SP-11
Scarifier (4")	15.48	SP-15
Rotopeen (4")	11.16	SP-11
Clean-N-Strip (4.5")	10.67	SP-11
Cup Wire Brush (4.5")	8.89	SP-3PWB
Portable Vacuum Blast Unit	8.73	N/A
Needle Gun Pistol Grip	7.93	SP-15
Bristle Impact tool	5.36	SP-11
Die Grinder (3")	4.00	SP-15
Needle Gun Inline	4.00	SP-15
Angle Grinder (5")	2.25	SP-15

Additional information:

- Tools that were **not able** to reach SP-11
 - Angle Grinder*
 - Needle Gun Inline and Pistol Grip*
 - Die Grinder*
 - Cup Wire Brush*
 - Scarifier*
- A Combination of different tools can be used to reach the user desired results
 - Ex: Deeper Surface Profile
(Remove Rust) + (Create Surface Profile)
Clean-N-Strip + Needle Gun
 - Other combinations of tools can also be used to reach different needs

Rust Grade C		
Surface profile		
Tool	Avg Surface Profile (Testex Mils)	Avg Surface Profile (SPG Mils)
Rotopeen (4")	4.55	3.69
Needle Gun Pistol Grip	4.1	3.28
Rotopeen (2")	4	2.16
Needle Gun Inline	3.5	3.01
Bristle Impact tool	2.85	2.557
Cup Wire Brush (4.5")	2.35	1.52
Die Grinder (3")	2.2	2.3
Portable Vacuum Blast Unit	2.1	1.31
Scarifier (4")	1.65	1.18
Clean-N-Strip (4.5")	1.55	1.1
Angle Grinder (5")	1.3	0.43

Guide Example: Noise and Vibration Data

Steel: Rust (Grade C)

Tool	Noise (dB)	Vibration RMS (m/s ²)	Time to reach EAV (Hours)	Time to reach ELV (Hours)
Angle Grinder (5")	102.8	2.0170	12:17	>24
Die Grinder (3")	94.5	2.6430	7:24	>24
Needle Gun Inline	108.7	2.1093	11:14	>24
Needle Gun Pistol Grip	114.8	1.9321	13:24	>24
Bristle Impact tool	100.5	2.0836	11:31	>24
Rotopeen (4")	118.2	3.0500	5:22	21:30
Scarifier (4")	121.6	10.1242	0:29	1:57
Portable Vacuum Blast Unit	115.0	N/A	N/A	N/A
Cup Wire Brush (4.5")	88.2	2.0975	11:22	>24
Clean-N-Strip (4.5")	93.0	2.1950	10:23	>24
Chipper Gun	120.8	18.1513	0:09	0:36

Aluminum: Bare Surface

Tool	Noise (dB)	Vibration RMS (m/s ²)	Time to reach EAV (Hours)	Time to reach ELV (Hours)
Angle Grinder (5")	90.1	1.7395	16:31	>24
Die Grinder (3")	90.5	2.0090	12:23	>24
Needle Gun Inline	113.9	1.6124	19:14	>24
Needle Gun Pistol Grip	114.8	1.0799	>24	>24
Bristle Impact tool	98.9	2.0082	>24	>24
Palm Sander	81.2	6.1784	1:19	5:14
Rotopeen (4")	115.1	2.6840	6:56	>24
Scarifier (4")	112.6	16.4956	0:11	0:44
Cup Wire Brush (4.5")	86.2	2.3017	9:26	>24
Clean-N-Strip (4.5")	89.1	1.4905	22:30	>24
Chipper Gun	110.8	18.0432	0:09	0:37

- All tools exceed OSHA “hazardous noise limit” 85 dB
- Exposure Action Value (EAV) – IOSH vibration exposure for a given tool above which action is needed to control exposure
- Exposure Limit Value (ELV) – IOSH exposure limit not to be exceeded in an 8 hour day

- All values in **RED** are above the “hazardous noise limit”
- All values in **YELLOW** the operator had to take a break while using the tool

Shipyard Visit

- Team visited NAASCO – San Diego on August 22-23, 2023
- *Feedback on data packet*
- Demo consisted of tool usage on welds, rust, PCP, Mill-Scale
 - Combination of tools witnessed
 - Most Rotary tools with varying consumables
 - Data gathered on Bristle impact, Vacuum Blaster, Angle Grinder (4.7 & 7"), Die Grinder, Needle Gun

Path Forward/ Final Stages

- Gather any final feedback from stakeholders in NSRP and industry on draft guide
- Provide final guide document
- Submit final report (9.30.2023)

