

# Optimize Power Tool Surface Preparation Panel Briefing

June 24, 2020



# Optimize Power Tool Surface Preparation

## PROJECT TECHNICAL REPRESENTATIVE

- Arcino Quiero, Jr., HII-NNS

## INDUSTRY INVOLVEMENT

- BAE Systems JSR
- HII-Ingalls Shipbuilding – Conlan Hsu

## NAVY INVOLVEMENT

- NSWC-Carderock – Omar Ramos

# Optimize Power Tool Surface Preparation

## SCOPE

- Task 1 – Literature Review
- Task 2 – Shipyard Demonstration
- Task 3 – Laboratory Testing
- Task 4 – Develop Guide Document

# Optimize Power Tool Surface Preparation

## SCOPE

- Consolidate power tool performance data from independent studies
- Develop a comprehensive list of generic type of power tools available to the industry
- Generate data on tool effectiveness in a shipyard setting which can be used by shipyards and industry to advance the state of the practice in power tool cleaning

# Major Activities to-date

- Performed literature review
  - Compiled a database of over 400 tools evaluated in Navy and industry studies
  - Compiled list of power tools used across multiple shipyards
  - Communicated with industry standards (SSPC) on power tool classification updates
- Participated in planning for industry sponsored demonstration at MegaRust
- Began planning of unique panel geometries for laboratory evaluations



# Literature Review – SSPC Power Tool Update

## Generic Categories

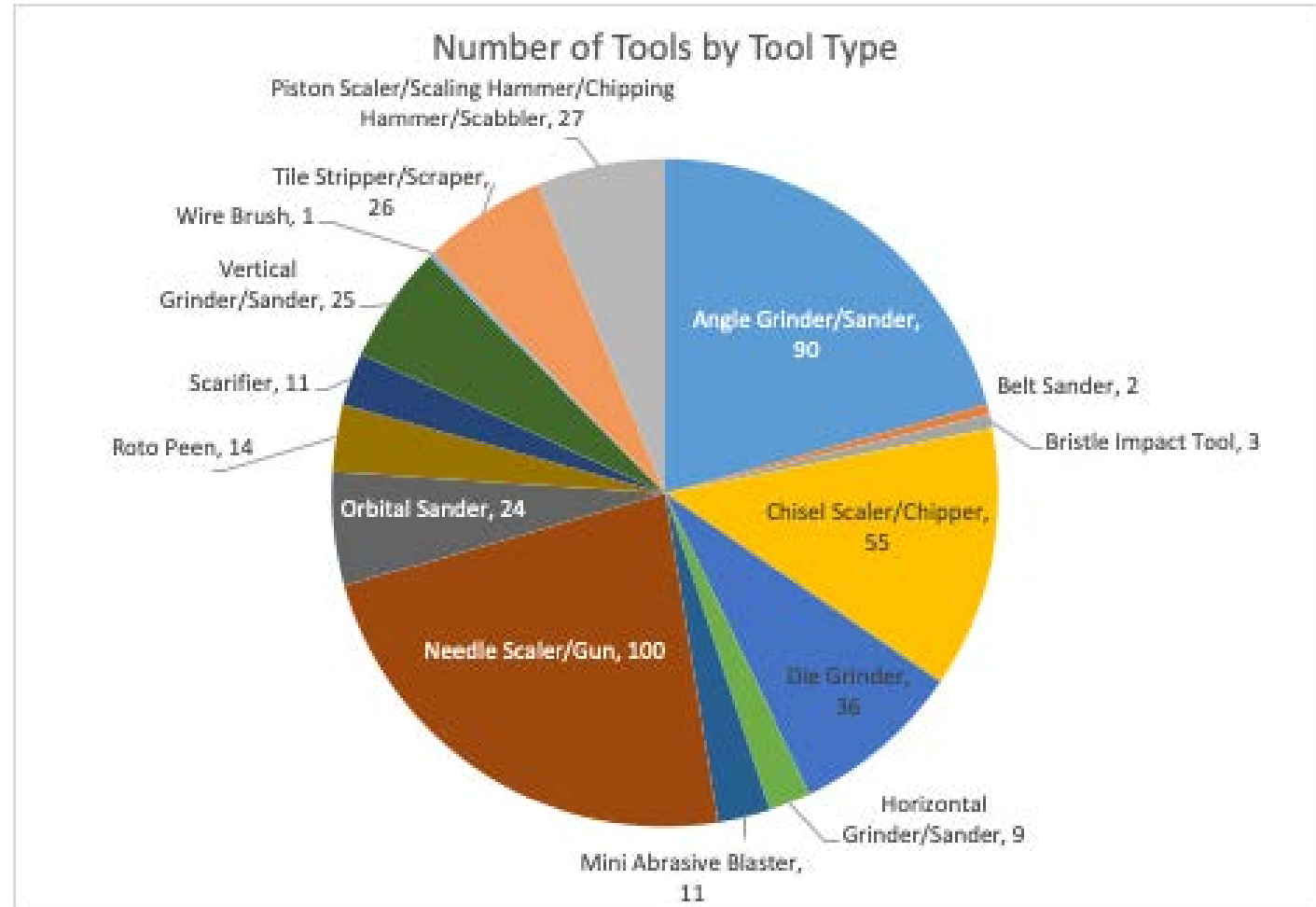
- Grinding Wheels Vitrified
- Coated Abrasive Discs/Belts
- Coated Abrasive Flaps
- Non-woven Abrasive
  - Unified
  - Flap
- Nonmetallic Brush (Abrasive filled)
  - Extruded
  - Molded
- Metallic (Wire) Brush
- Rotary Flapper Metallic/Ceramic
- Cutter Bundle Metallic/Ceramic
- Needle Gun
- Scaler or Chisel
- Bristle Impact

SP11, SP15	
Removes Initial Condition (SSPC VIS 3)	Complete Millscale (A)
	Partial Millscale (B)
	Complete Rust (C)
	Rust and Pitting (D)
	Thin Coating Over Blast Cleaned Surface (E, F)
	Weathered Multi-coat System (G)
Remove Pack Rust	
Remove Stratified/Laminar Rust	
Coating Removal (THICK FILM over 40 mils)	
Create Anchor Profile	1 mil
	2 mils
	3 mils
	4 mils
Clean Large Pits (define "large pits" up to 3 mm deep?)	
Ability to access complex geometries	
Minimal Damage to Existing Profile	
Feather Edges	
Welds	Clean
	Profile
Roughen Existing Coating	
Cold Spark	
Non-Spark	
Controlled Emissions (e.g., Vacuum Capability)	

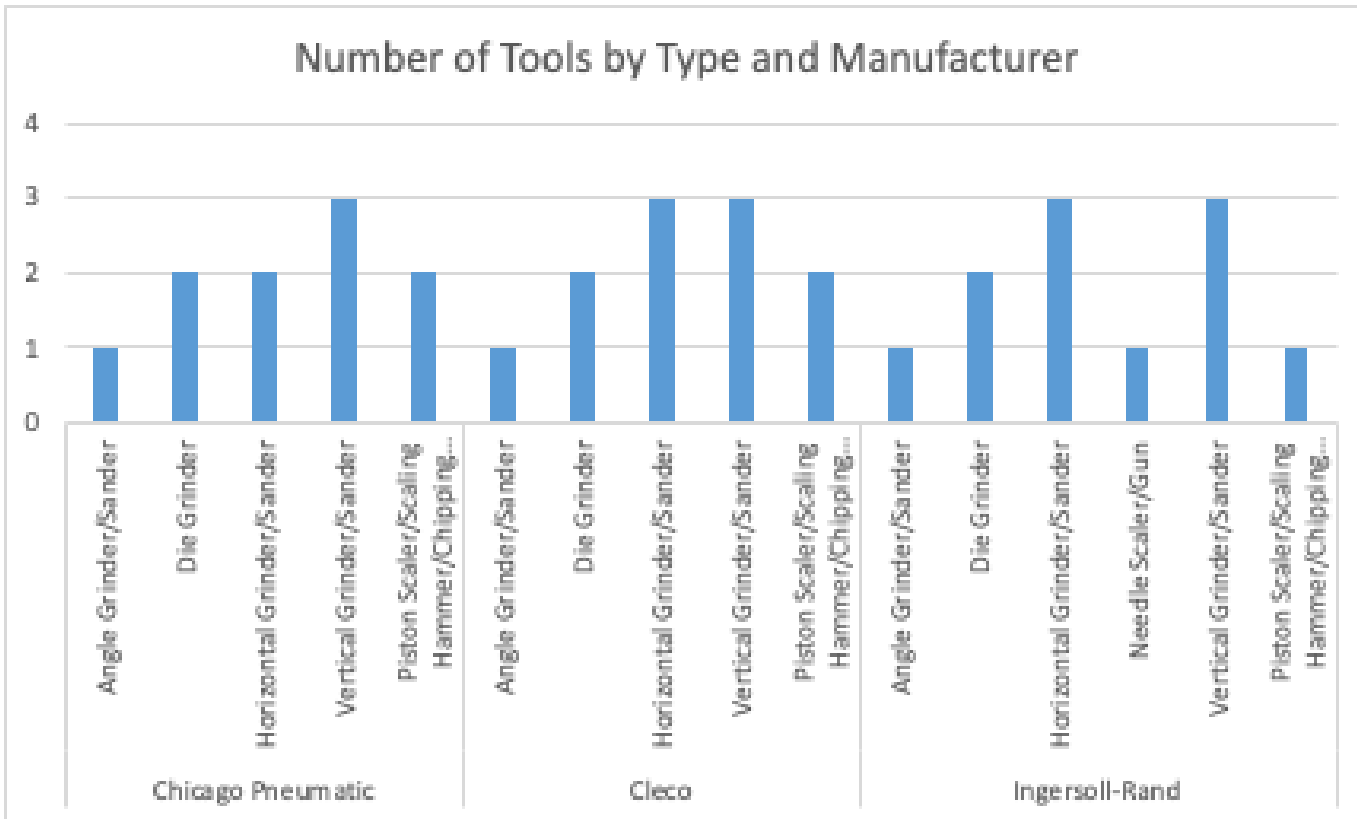
# Literature Review

## Literature Review Database

- 435 Unique Tools
- 15 Distinct Categories
  - One Hand Tool
- Five NSRP / Navy Studies



# Literature Review – NSRP Study (1977)

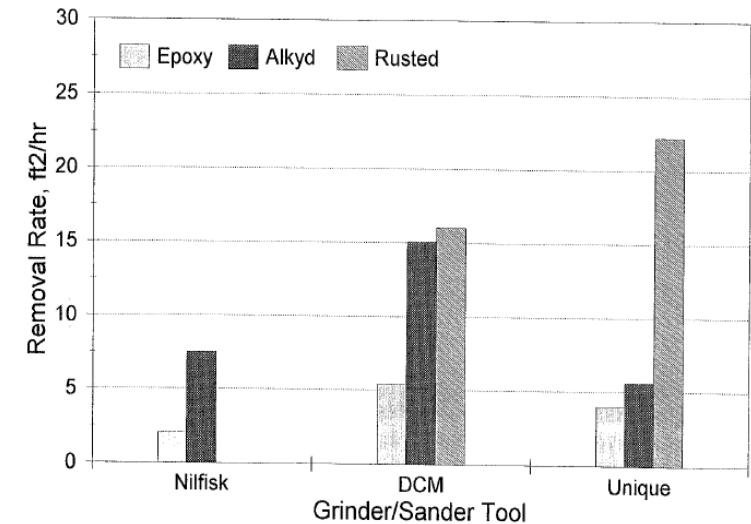
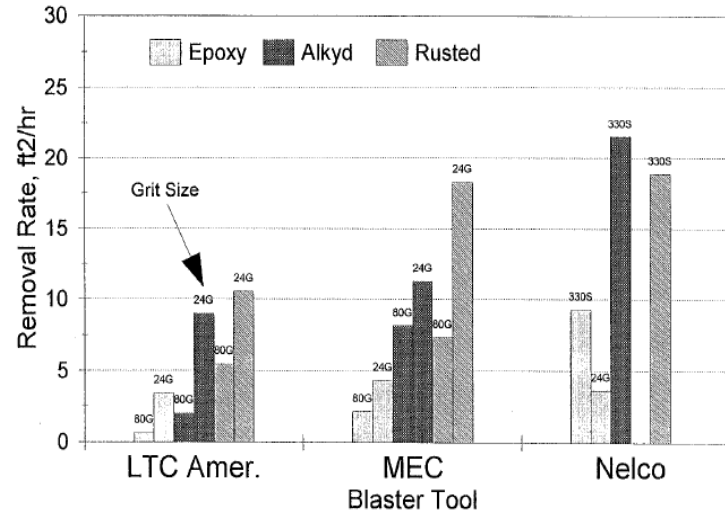


- Six Separate Tool Types
  - Thirty-three different tools
  - Three different manufacturers
- Conclusion: Increased productivity can be achieved through improved operational planning and greater understanding of the principles of efficient operation by first-line supervisors and operators.



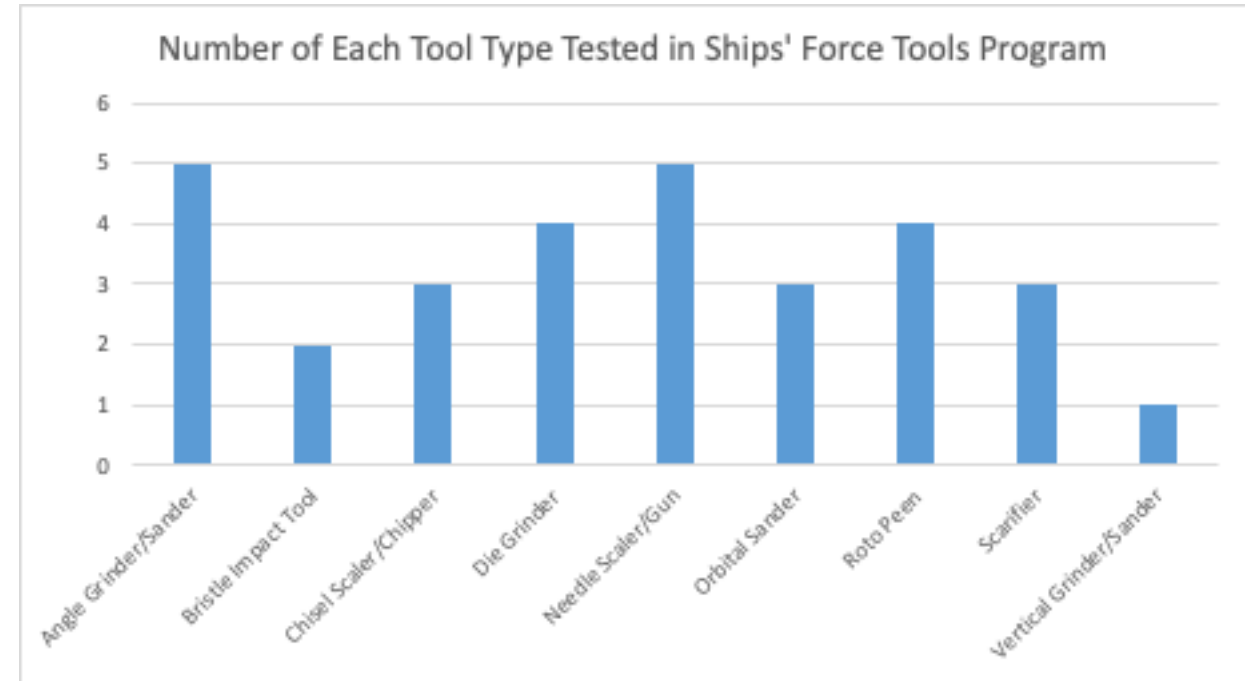
# Literature Review – SERDP Study (1995)

- Comparison of mini blasters and grinders
- Tools tested on complex panels for removal rates
  - Various levels of corrosion evaluated
  - Various coating stack ups evaluated
- Conclusion: Despite mini blasters being more effective for coating and corrosion removal, it was noted that they were often tiring and difficult to use.



# Literature Review – NSWC-CD Study (current)

- 375 tools evaluated
- 40 Individual tools tested
  - Various substrates & coating stack ups evaluated
  - Cleaning rates, profile, vibration, and noise evaluated
- Project on-going, results expected over the next year



# Literature Review – Other Studies

## [Fundamentals of Bristle Blasting Processes \(2009\)](#)

- Comparisons of bristle blasters to wire brushing and grit blasting
- Conclusion : Bristle blasted surface are closer to an SSPC-10 or other abrasive blasted surfaces compared to other power and hand tools

## [Monti Industrial - Bristle Blaster Study \(2019\)](#)

- Comparisons of bristle blasters to wire brushing and grit blasting
- Conclusion: The tool is ideal for maintenance work in areas of 30 square feet (3 m<sup>2</sup>) or less and areas where abrasive blasting cannot be used.

## [The Effectiveness of Power tool Cleaning as Alternative to Abrasive Blasting \(1995\)](#)

- This study found that power tool repairs performed equal to or better than SSPC-SP 10 and SSPC-SP 7 repairs in the salt spray and marine environments for all coating systems with repaired zinc rich shop primer
- Conclusion : This program shows that power tooling is an effective repair method in short term applications and that power tools that provide a greater profile can promote the repair performance.

# Wide Range of Power Tools used in Shipyards

- **Disc Sander (Buckeye)**
- **Wire Wheel (Burr)**
- **Needle Gun**
- **Bristle Blaster**
- **Deck Scaler**
  - Four different types used: Heavy, Steel, Beam, Carbide Tipped
- Roto Peen
  - Three different types used: Heavy, Steel, Beam
- Mini Belt Sander
- Desco SP90
- Knocker Prongs
- Chipping Hammer Chisel Tip
- Straight Grinder
  - Four different types used: Non-Woven Abrasives, Crimped Wire Brush Wheel, Grinding Wheel, Spiral Abrasive
- Sanding Pad
- Sanding Discs

# Path Forward

- Down-select power tools with panel project participants for field demonstration.
- Perform power tool testing in two shipyard environments – one representing ship repair and one representing new build.
- Perform more quantitative testing of issues identified in the field and from literature review.
- Develop Guide Document.

Questions?