

Implementation of SP-18 “Thorough Spot and Sweep Blast Cleaning for Industrial Coating Maintenance” in Shipyard Construction

NSRP SPC Panel Meeting
September 2023



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Scope of Work

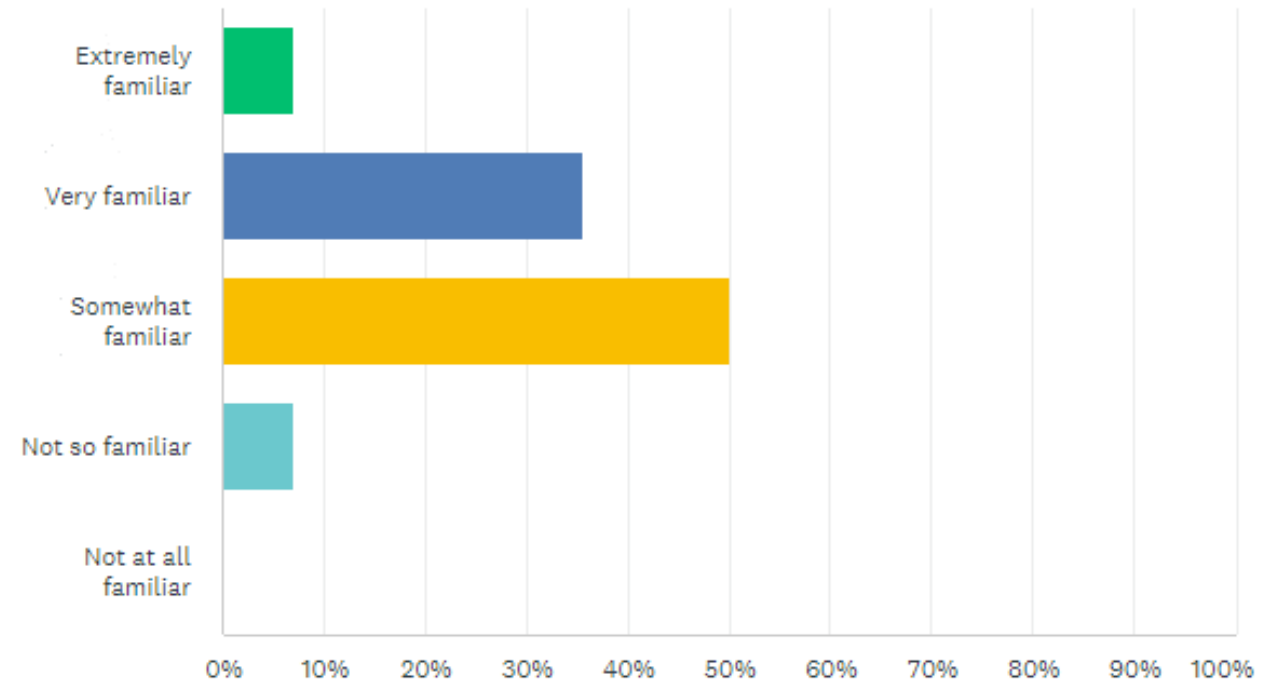
- Use current training and guidance from other industries and lessons learned from previous projects to implement use of SSPC-SP 18 in shipyards and demonstrate potential cost and time savings for both users and customers
- Goals/Objectives
 - Implement use of clearly written instructions and visual aids of what acceptable levels of cleanliness are and how to inspect them
 - Onsite demos and training to ensure understanding of the standard
 - Gather data and feedback to improve training
 - Make available the training documents and extend offerings for additional demos

Tasks

- Assemble Stakeholders and Establish Necessary Training
 - Define scope and overall expectations of the training documents and demos.
- Shipyard In-Person Instruction, Demos, and Implementation
 - Visit at least two shipyards and provide on-site instruction. Provide copies of visual aids and instructions prior to visits.
- Update Visual Guide Tools and SP18 Instruction from feedback
 - Use feedback from on-site visits to update aids and instructions. Updated copies to be distributed to yards for implementation.
- Shipyard In-Person Follow-up and Lessons Learned
 - Visit shipyards again to document benefits of SP18 and lessons learned.
- Publish and Distribute Final Training Documents

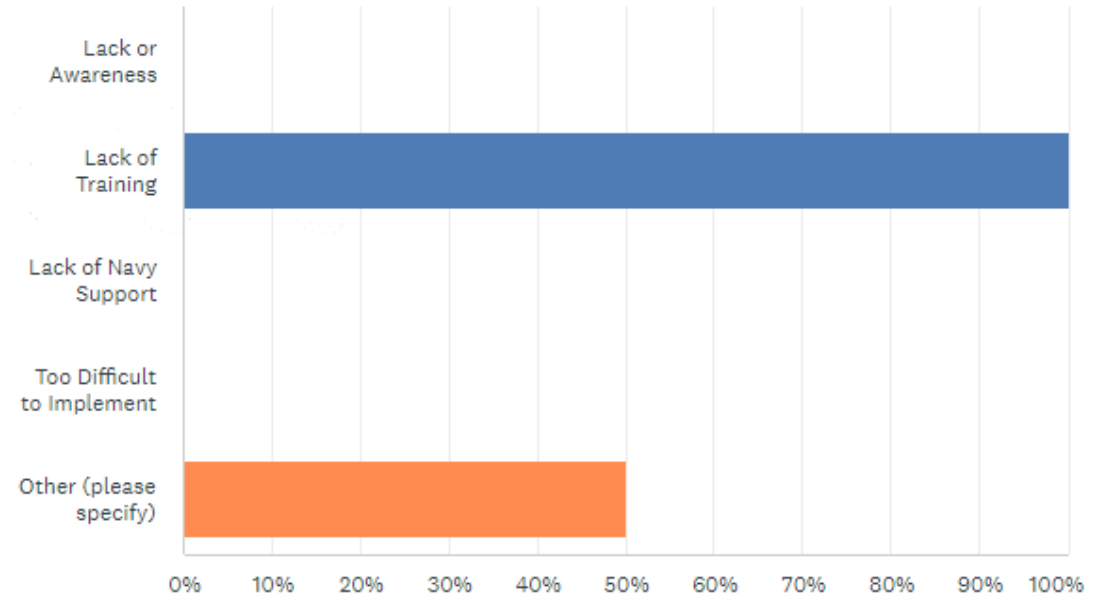
Initial Survey Results

- 7 partner shipyards were surveyed on their familiarity with SP 18 and any hurdles they may have encountered during implementation
 - HII-Ingalls
 - HII-NNS
 - Electric Boat
 - BAE
 - Bath Iron Works
 - Fincantieri Marine Repair
 - Fincantieri Marinette
- Results show that half the respondents were at least somewhat familiar with the standard itself

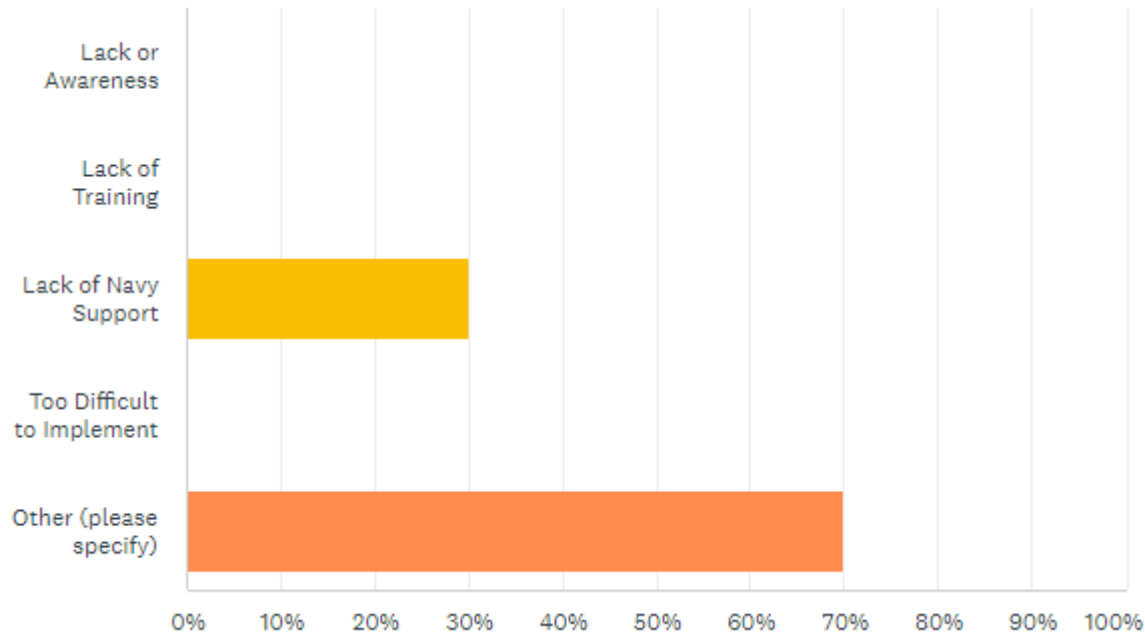


Initial Survey Results

- Shipyards were also asked if they were currently using SP18 in production.
 - Only one yard stated they are successfully using SP18
- Biggest hurdles experienced
 - Lack of QA Training
 - New process for the Navy



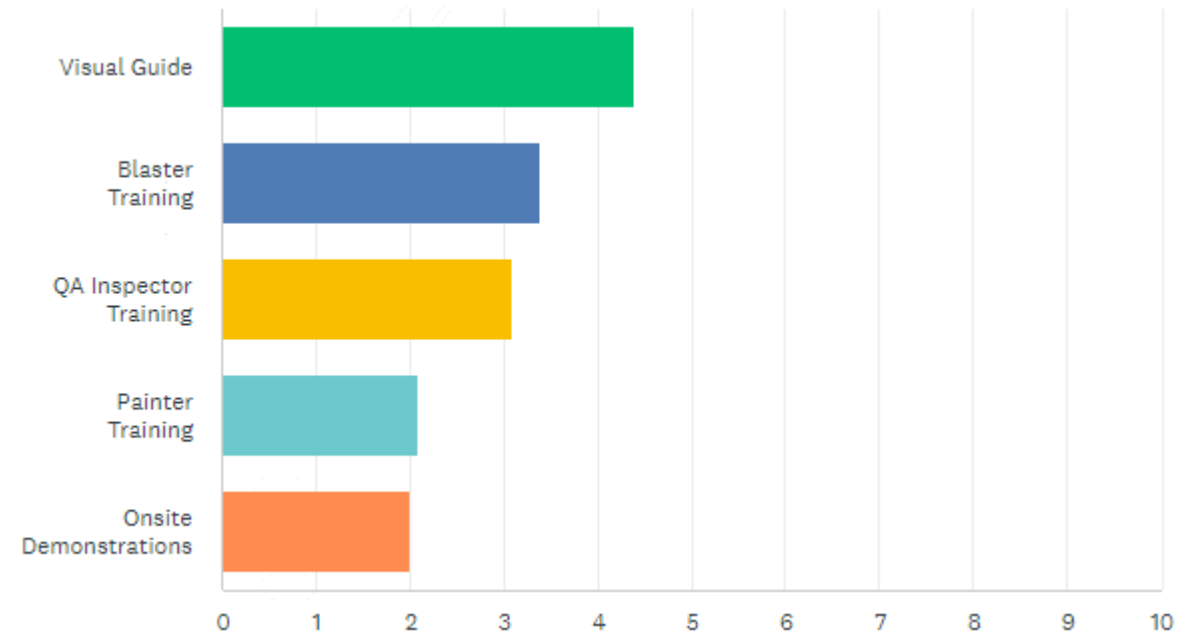
Initial Survey Results



- Yards not currently using SP18 in production expressed common reason why
 - Not currently specified by Navy
- Most yards not currently using SP18 are open to trying

Initial Survey Results

- When asked what would be most beneficial from the NSRP community
 - Visual Guide was #1 choice
 - Blaster and QA Training were close behind



Post Survey Tasks

- Meeting held to build Outline for Visual Guide
- Draft Visual Guide created and provided to partnering yards and PTR for Comment
- Scheduled Demonstrations at two partnering yards
- Worked with AMPP on SP-18 language reference

Visual Guide – Outline Part 1

- Background of standard
 - Describe criteria and general purpose of standard
- Initial conditions
 - Define initial condition
 - Tank coated with 23236 Type VII material
 - Describe language in 009-32 Table 2 Lines 32A and 33A and Table 4 Lines 19 and 24A
 - Generally have signs of some failure in areas while remaining intact in a majority of the space
- QA Inspection

Visual Guide – Outline Part 2

- Acceptable final condition
- Unacceptable condition #1 – Edge of blasted areas
 - Sharp edge at transition
- Unacceptable condition #2 – Intact coating not swept blast
 - Remaining intact material not properly blasted to remove gloss
- Unacceptable condition #3 – Swept intact coating but bare steel does not meet SP10
 - Loose coating has been removed to intact areas, remaining intact coating has been properly swept
 - Bare steel does not meet SP10 criteria
 - Possibly SP6 condition
 - Coating remaining in pits

Visual Guide – Draft Part

Visual Guidance for SSPC-SP 18 Thorough Spot and Sweep Blast Cleaning for Industrial Coating Maintenance



RECOMMENDED GUIDELINES FOR EVALUATING SSPC-SP 18

INTRODUCTION

This guide was developed based on the work of National Shipbuilding Research Program (NSRP) Surface Preparation and Coatings Panel, SP-3. This is a non-mandatory guide intended to help the inspector and customer to determine conformance to the requirements of SSPC-SP 18 after abrasive blasting.

DEFINITIONS

For the purposes of this guide, the following definitions shall be used:

Spot Blasting: Localized abrasive blast cleaning as used in surface preparation for maintenance painting. Often applied to specific areas where corrosion or coating weaknesses are evident (e.g., blistering, delamination, cracking). Areas shall be free of all visible oil, grease, dust, dirt, mill scale, rust, coating, and other foreign matter. Random staining shall be limited to no more than 5 percent of each unit area of surface, and may consist of light shadows, slight streaks, or minor discolorations caused by stains of rust, stains of mill scale, or stains of previously applied coating.

Sweep Blasting: A fast pass of the abrasive blasting pattern over a surface to remove loose material and to roughen the surface sufficiently to successfully accept a coat of paint.

Job Reference Standard (JRS): A sample area representative of the surface to be blasted which shows the degree of surface preparation specified. It is to be documented, preserved, or both, to serve as a reference for the duration of the project.

ACCEPTABLE SSPC-SP 18 FINAL CONDITION

A thorough spot and sweep blast cleaned surface, when viewed without magnification, shall consist of areas of exposed steel cleaned to SSPC-SP 10

(near-white metal) level of cleanliness, as well as areas of retained existing coating.

Retained existing coating shall have sufficient adhesion that it cannot be removed with a dull putty knife. The borders of the retained coating shall have no clear shoulder or edge at the coating/substrate interface. Retained coating shall also have no visible cracks, blisters, delamination, or other defects after the blasting. The retained coating shall also have no chalking or residual corrosion staining. The retained coating shall be uniformly roughened and shall not have any area larger than $\sim 1/16$ in² (40 mm²) that exhibits the appearance of undisturbed coating.

SP-18 FUNCTION

Thorough Spot and Sweep Blast Cleaning is used when the objective is to remove all failing or poorly adhered coatings, establishing a near-white metal level of cleanliness on all exposed steel, and a thorough, uniformly roughened surface on all retained coatings. The primary functions of blast cleaning before coating are:

- To remove material from the surface that can cause early failure of the coating system;
- To obtain a suitable surface profile (roughness) to enhance the adhesion of the new coating system; and
- To facilitate a uniform, continuous coating film across the surface being protected, minimizing the extent of borders between newly installed repair coating and the existing retained coating.

EVALUATING RETAINED COATING

Color can be a useful indicator for sufficiency of roughening of retained coatings. For example, removal of yellowed/faded material can be a visual cue of sufficient cleaning. Similarly, removing the contrasting color of a finish coat is also a visual cue. Retained coating should have no visible retained gloss or reflective appearance after blast cleaning.

Retained coating should exhibit a reasonably uniform appearance. The abrasive nozzle pattern used should not be visually obvious as evidenced by "streaks" across the retained coating.

PREPARING AND EVALUATING EDGES OF RETAINED COATING

The edges of retained coating will generally exhibit a mottled, tapered appearance. While the abrasive blasted edges may be described as "feathered," feathering using hand or power tools is neither beneficial nor desired.

FILM THICKNESS

Coating thickness is critical to adequate performance. At a minimum, the dry film thickness of the entire coated area should meet the coating manufacturer's recommended thickness, though areas of retained coating may have a higher allowed thickness. To ensure that coating thicknesses are properly measured, the procedures in SSPC-PA 2 for verification of accuracy of Type 1 and Type 2 gages should be used.

009-32 REFERENCE

Per NSI 009-32 Attachment F:
"The SSPC-SP 18 surface preparation must only be conducted in accordance with the specified lines in Table 2 and 4. The SSPC-SP 18 surface preparation process must only be conducted in areas previously coated with MIL-PRF-23236, Type VII coatings. Validate that areas were previously coated with MIL-PRF-23236, Type VII coatings by QA records review or by validating dry film thicknesses in the area are between 14 and 30 mils.

Preparing an area in accordance with SSPC-SP 18 does not waive any surface preparation QA steps or data recording requirements except as modified below."

Specific areas allowing use of SSPC-SP 18 are found in the following locations:
Table 2 Lines 32A and 33A

- Well deck overheads, both exposed & non-exposed to LCAC exhaust, and enclosed boat handling area overheads

Table 4 Lines 19 and 24A

- Ballast tanks, floodable voids up to 10 years service life
- Chain lockers and non-floodable voids

ILLUMINATION AND DISTANCE OF INSPECTION

Illumination is a very important factor in making any quantitative evaluation. Visual inspections should be aided by a minimum of ~ 50 foot candles (540 lux). Low light levels will make it difficult to determine if clean steel is visible and the retained coating adequately abraded. In addition, the angle at which the surface is viewed can affect its appearance. Color is dependent on the light source, viewing angle, and ambient conditions (sunny or cloudy sky, presence of shadows). See SSPC-Guide 12 for guidance on proper lighting. Distance from the surface can alter one's perception. To properly evaluate and inspect the blasted surfaces, the inspector should be no more than an arm's length from the surface being evaluated.

PRE-COATING APPLICATION

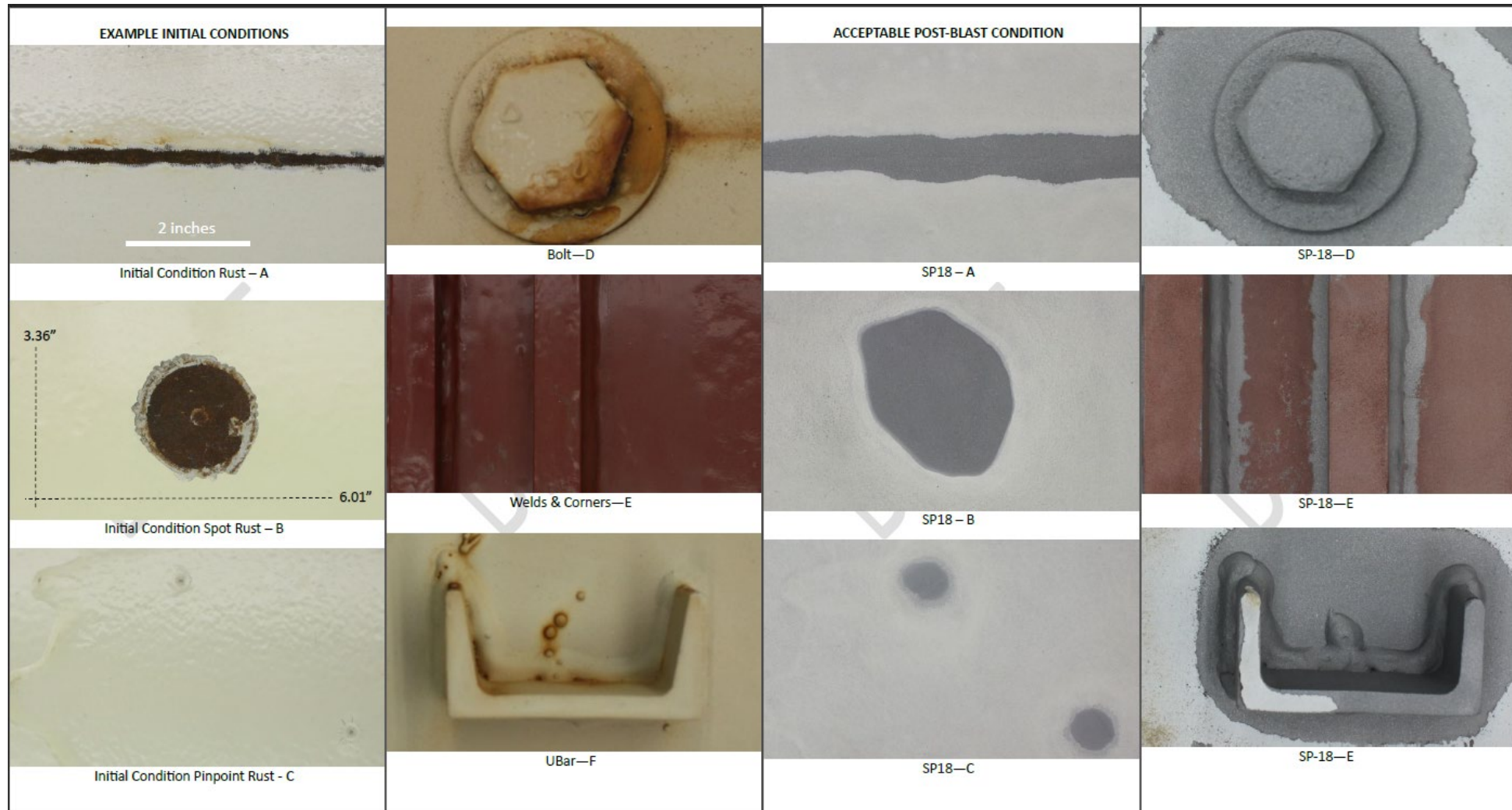
Visible deposits of oil, grease, and other contaminants shall be removed by methods in accordance with SSPC-SP 1 or as specified. Dust and loose residues shall be removed from blast cleaned surfaces and retained coating by brushing; blowing off with clean, dry compressed air; vacuum cleaning; or other methods specified in the procurement documents.

Immediately prior to coating application, the entire surface to be coated shall comply with the degree of cleanliness defined by this standard. Any visible rust that forms on the surface of the steel after blast cleaning shall be removed by blast cleaning or other methods specified in the procurement documents before coating.

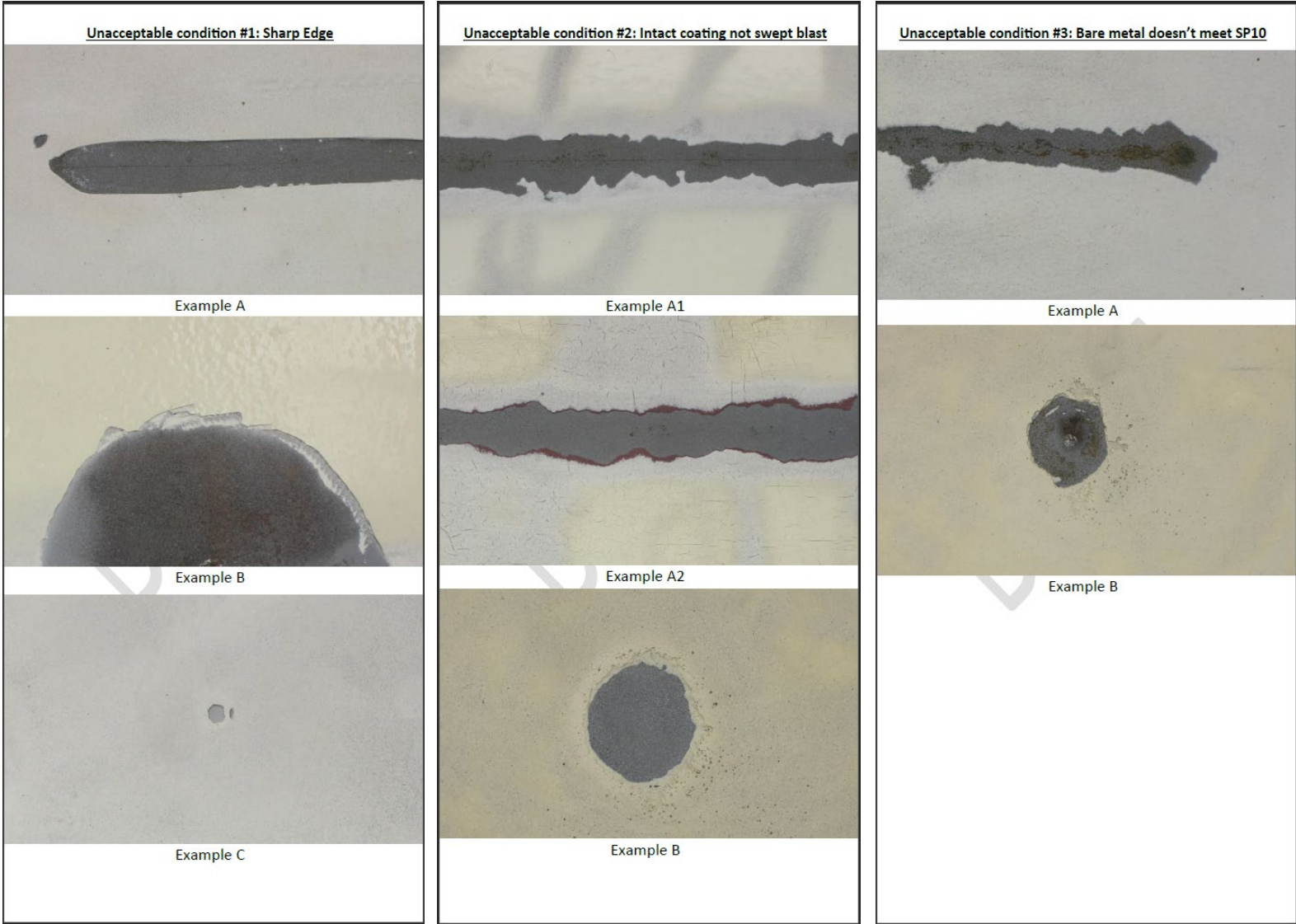
ACKNOWLEDGMENTS

This guide was prepared by the National Shipbuilding Research Program (NSRP) Surface Preparation and Coatings Panel (SP-3). Acknowledgement and thanks are given to the many participants in the NSRP projects which led to the development of this guide including:
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Visual Guide Draft - Initial Condition / Acceptable Condition



Visual Guide Draft –Unacceptable Conditions



Shipyard Feedback

- Provided multiple copies to various partner yards
 - HII NNS, Fincantieri Marine Repair, Nassco
- Comments thus far have been format related
 - General feedback is this will help QA process
- Updated pictures to better convey information
 - Pictures provided by yards and recommendations on areas to include

Path Forward

- Provide Updated Visual Guide for NSRP community
- Publish final report (9.30.2023)

Questions?

