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Evaluation of Prequalified Procedures for Naval Construction

Welding Technology Panel Meeting
Dayton, Ohio
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Evaluation of Prequalified Procedures for Naval Construction

- NSRP Welding Technology Panel Project
- Contract Number 2008-339
- Program Technical Representative (PTR):
  - Mike Ludwig, BIW
- Program Technical POC:
  - Luke Blessinger, ATI
- Period of Performance:
  - Dec. 5, 2007 to Nov. 30, 2008

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Background:

- Requirements for vendors and suppliers to prepare, qualify, and submit welding procedures for approval takes time and effort that significantly impacts the cost and construction time for Navy ships.
- Commercial codes permit the use of prequalified welding procedures.
- Can prequalified procedures be used to reduce duplication of effort and lower the cost of building Navy ships?

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Objective:

- Investigate the use of prequalified welding procedures for Navy ship construction.
- Estimate cost savings, and develop a recommended implementation approach.

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Scope of Work:

- Gather data from shipyards:
  - Common processes, materials, and procedures requiring review.
  - Level of effort involved in review and approval
  - Estimated savings in cost and schedule for prequalified procedures.
- Develop list of materials, processes, and applications where prequalified procedures will be most beneficial.
- Review the use of prequalified procedures prepared by organizations such as the American Welding Society.
- Draft requirements for use of prequalified procedures and describe proposed integration with existing standards (Tech Pub 248/278).
- Obtain feedback from stakeholders (shipbuilders, NAVSEA, ABS).
- Report results with a recommended implementation plan.

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Preliminary Shipyard Input:

- Most common materials: S-1, S-8, and S-34.
- Most common processes: GTAW, SMAW, GMAW, FCAW.
- Applications are machinery and piping systems covered by Tech Pub 278.
- Procedures processed per year: 50, 250, 750
- Time per review: 2 to 4 hours
- Review Cycles per procedure: 1 to 3 times
- Existing standard procedures:
  - Navy seal welding manual
  - Public shipyard pipe welding procedures
  - Thermal spray repair procedures
  - ??

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Commercial Codes Permitting Prequalification:

- **AWS D1.1 Structural Welding Code** – permits prequalified WPSs as detailed in code.
- **AWS D1.6 Structural Welding Code- Stainless Steel** - permits use of AWS B2 Standard WPSs with some application limits.
- **AASHTO/AWS D1.5 Bridge Welding Code** – permits prequalified WPS for SMAW only.
- **ASME Section IX** – permits use of use of AWS B2 Standard WPSs that are listed in the appendix and when impact testing is not required. Requires welding and testing of one plate.
- Others??

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AWS Standard Welding Procedure Specifications (WPS) –

- Over 50 have been produced by the AWS B2 committee and the Welding Research Council
  - Each is supported by PQRs referenced in the document.
  - These documents are American National Standards.
- Examples:
  - B2.1.207 – GTAW of Carbon Steel (M-1/P-1/S-1)
  - B2.1.208 – SMAW of Carbon Steel (M-1/P-1/S-1)
  - B2.1.212 – GTAW of Stainless Steel (M-8/P-8/S-8)
  - B2.1.020 – FCAW of Carbon Steel (M-1/P-1/S-1)
- None on GMAW, S-34 or dissimilar materials.

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Initial Concept:

- Procedures for S-1 and S-8 materials welded with GTAW, SMAW, GMAW, FCAW.
- Machinery and piping systems to Tech Pub 278.
- Use AWS Standard WPSs as “straw-man” procedures.
- Identify areas of non-compliance with NAVSEA 248/278.

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Potential Questions/Issues:

- Limited list of base materials – adoption of AWS B2, M-1 materials?
- Use of AWS electrodes vs MIL-spec electrodes?
- Lot conformance issues?
- Need for other materials beyond S-1, S-8, S-34?
- Need to address PWHT?
- Toughness requirements?
- Base material cleaning?

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Potential Questions/Issues - continued:

- Documentation of inspection of PQR test (visual, etc)
- Preparation of supplementary document to address areas needed.
- How to develop procedures for areas not covered by current AWS WPSs
- Will shipyards provide procedures to fill gaps?
- What organization will monitor and update procedures?

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Next Steps:

- Additional input needed on procedures, review cycles, and costs
- Comments and suggestions on approach
- Other issues to be addressed

Your Input Is Important

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Questions

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