Welding & Repair Technology Center

Overview

Annual NRC/Industry Technical Exchange

Tuesday June 4, 2015

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EPRI – WRTC

Welding & Repair Technology Center - Mission

- Focus on both tactical issues and strategic research
  - Provide a framework for identifying, prioritizing, and tracking welding, fabrication, and repair related technology “gaps”
  - Lead R&D activities and technology development to supplying the necessary “TOOL” to address current and future repair, fabrication, and mitigation issues

WRTC Objectives

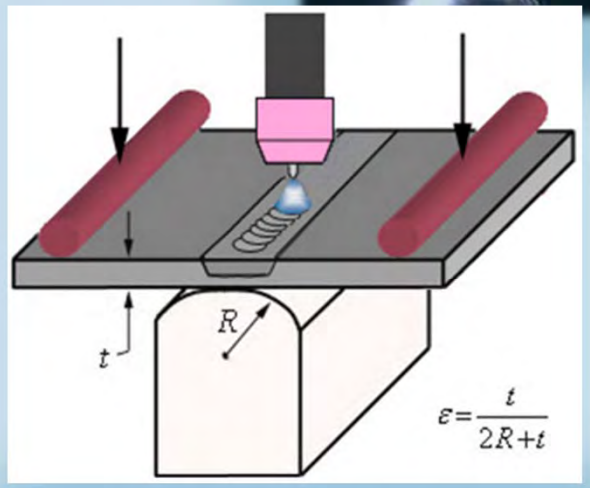
- *Establish repair techniques and develop technologies that can improve material performance, enable component life extension, increase plant availability, and reduce repair costs and time.*
- *Research activities to support technical interactions with Code (implementation)*
- *Forums for sharing operating experience, discussing repair, fabrication and weld program issues and industry emerging issues*
- *Provide access to materials, welding, and repair experts across the EPRI and the nuclear industry*

WRTC - Overview

- WRTC maintains a balanced portfolio
  - 11 Strategic Focus Areas (SFA) established
    - WRTC identified technology gaps
    - WRTC establishes project scope to address or close these gaps
    - SFA may also contain Executive Roadmaps
      - Roadmaps address highly collaborative research areas

WRTC Strategic Focus Areas

- Solution Area 1a and 1b: Nickel-Base Filler Metal Weldability: Alloy 52 Weldability and New Alloy development
  - optimization of Alloy 52 weldability
  - alternate weld filler metal that retains adequate margins to PWSCC
- Solution Area 2: Irradiated Materials Welding Solutions
  - focus on developing near-term solutions, and fundamental research
- Solution Area 3: Identify, Research, Develop, and Mature Advanced Welding Processes
  - Keeping nuclear industry up with current technology (welding and joining processes)



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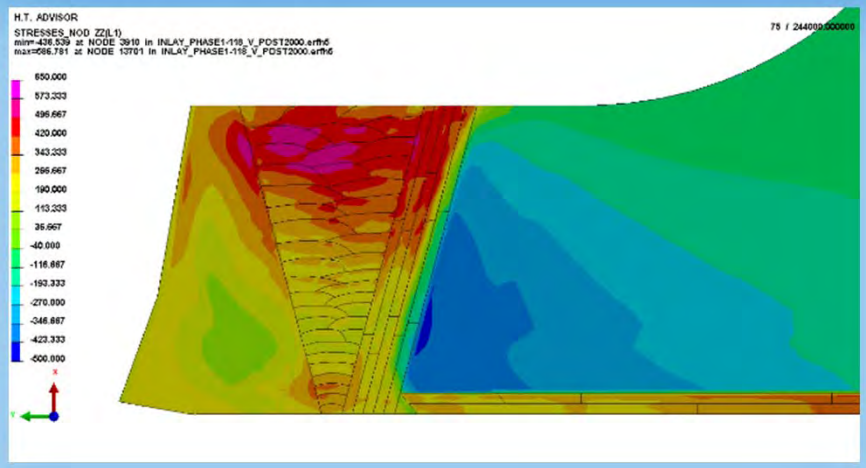
WRTC Strategic Focus Areas

- Solution Area 4a: Optimize Joining, Fabrication, and Repair Processes
  - Opportunity to optimize and improve established welding processes and procedures.
- Solution Area 4b: Stress Optimization
  - Optimize residual stresses through surface conditioning and other techniques.
- Solution Area 5: Small Bore Piping Asset
  - Small bore piping issues and eliminating small bore piping failures



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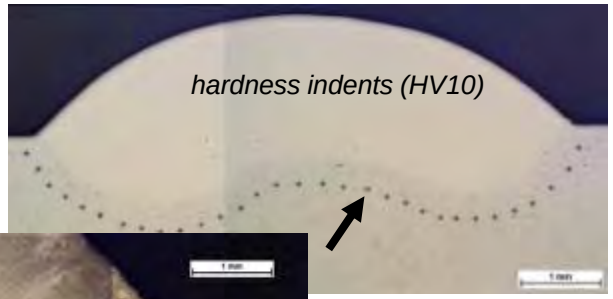
WRTC Strategic Focus Areas

- Solution Area 6: Transfer & Promote Fabrication & Joining Technologies into Codes, Standards, & Regulations
  - Promoting Code and Regulatory adoption of code changes, Code Cases
  - Provide technical bases documents
- Solution Area 7: Buried Pipe Asset Management / Repair Solutions
  - repair/replacement issues
- Solution Area 8: Repair Solutions for Structures: Containment and Fuel Pool Asset Management
  - Repair solutions for critical nuclear structures

Hydrogen Testing SMAW TB – Code Case N-839



QW-290 updates & Temper bead qualification by new hardness protocol

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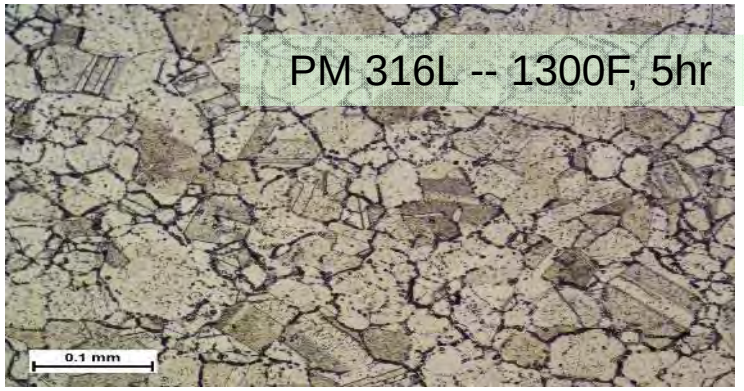
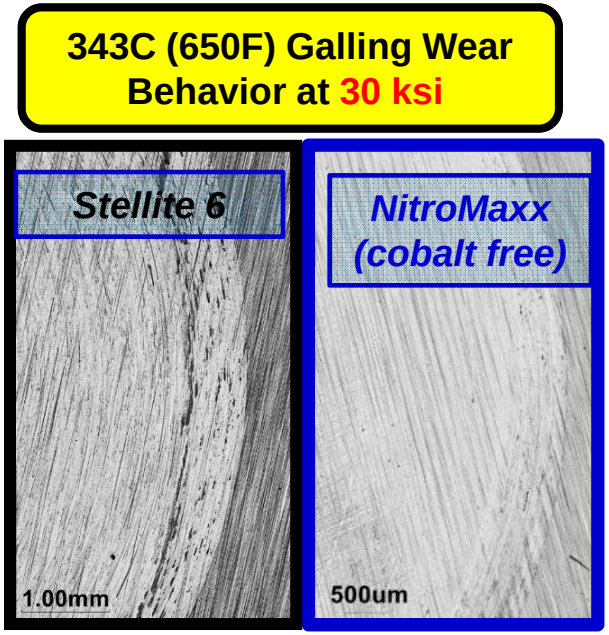
WRTC Strategic Focus Areas

- Solution Area 9: Tactical Implementation of Repair Methods
  - Guidance for implementation
- Solution Area 10: Document & Evaluate Operating Experience for Welding & Repair Programs
  - This solution area addresses trending and tracking of industry performance and development.
- Solution Area 11: Thermal spray, Coatings, and Hardfacing Applications (including Powder Metallurgy)
  - Solutions for surface conditioning, new fabrication methods





Executive Roadmaps – WRTC

- *New welding technology and guidance for the repair of highly irradiated materials*
- *Alloy 52M Nickel-base filler metal weldability guidance and material solutions*
- *Advance welding process development in nuclear power industry*
- *Advancements in Code and regulatory requirements for repair, replacement and mitigation techniques.*
- *Other supporting roadmaps or Solution Areas:*
  - *Best Practices for Welding Residual Stress for Repair and Fabrication*
  - *Used Fuel Storage Issues regarding fabrication and repair*
  - *Nuclear Pool (Spent Fuel Pool) Leakage*
  - *Socket Weld Resolutions*
  - *Powder Metallurgy Materials*

690 strip cladding mockups and process controls

Friction stir welding development

Welding residual stress measurements

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