Welding & Repair Technology Center

Overview

Annual NRC/Industry Technical Exchange
Tuesday June 4, 2015
Steve McCracken,
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)
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
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
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
Together…Shaping the Future of Electricity