

Peening Confirmatory Research

Materials Meeting

May 2017

Peening Background

- 3 Aspects
 - Peening may be conducted under 50.59
 - MRP335 Rev 3-A provides basis for inspection relief for peened components
 - Inspection relief authorized based on plant specific request which documents conditions of MRP-335 are met

Peening Background

- Safety Evaluation for MRP-335
 - Does not address uncertainty of residual stress measurements
 - Proposes confirmatory research
- Confirmatory research is not
 - Comprehensive review of peening
 - Revisiting findings in the safety evaluation
 - Delaying review of plant specific requests

Peening Background

- NRC staff is in receipt of industry comments on peening program
 - Comments are being considered

Research Program

- 4 components
 - Evaluate existing information on
 - Crack initiation of peened components
 - Uncertainty of residual stress measurements
 - Experimentally assess peening effect on NDE
 - Experimentally assess uncertainty of residual stress measurements
 - Experimentally assess crack initiation in peened components

Existing Information Review

- Conduct review of existing information on crack initiation and residual stress measurement uncertainty
 - Assessment across industry
 - Confirmatory review of related reports
 - Discussions with external stakeholders
 - Will be used to help define specifics and extent experimental program

Effect of Peening on NDE

- Existing dissimilar metal weld with implanted flaws
 - Examine with UT and ET
 - Peen
 - Examine with UT and ET
 - Identify differences in response if any
- Primary interest is ET

Residual Stress Uncertainty

- Uncertainty of residual stress measurement specifically excluded from MRP-335 SE
- X ray diffraction is technique of choice
 - Potential high uncertainty especially for welds
 - Potentially less representative of truth state than some other methods

Residual Stress Uncertainty

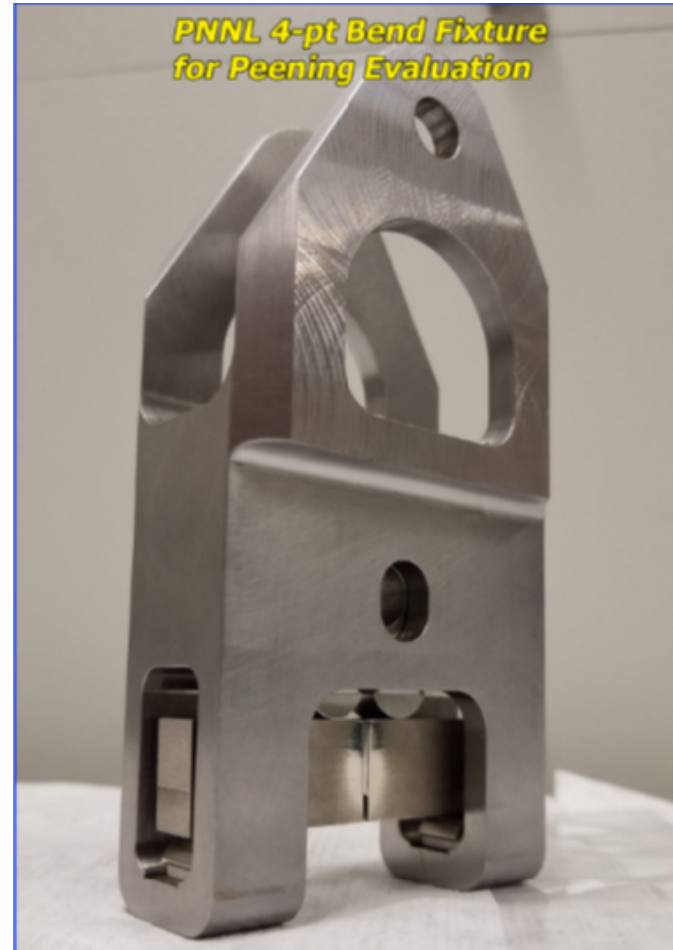
- Experimental program will investigate:
 - Uncertainty
 - Many measurements of peened weld on plate
 - Comparison
 - Many measurements of peened weld on plate using hole drilling
 - Compare mean values with x ray

Crack Initiation

- Peening has long history of success for fatigue
- Peening has less history for PWSCC
- Experimental program
 - Compare crack initiation of peened and unpeened samples
 - In realistic environment (autoclave)
 - Replicate samples
 - Multiple samples tested simultaneously

Crack Initiation

- 4 point bend specimens
- Comments solicited to define test plan
 - Public meeting?
- Initiation not expected
 - If observed will seek public input on significance



Conclusion

- Program
 - Confirms specific aspects of safety evaluation
 - Does not revisit conclusions of safety evaluation
 - Does not delay relief requests
 - Is still under development
- Industry comments under review
- Additional comments appreciated