Residual Stresses in U.S. Nuclear Power Systems

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Abstract

Environmentally assisted cracking of components in nuclear power systems is an area of continued focused research by the domestic and international nuclear power industry and regulatory bodies. Domestically, the U.S. Nuclear Regulatory Commission (NRC) is currently conducting several research programs evaluating environmentally assisted cracking in pressurized (PWR) and boiling water reactors (BWR) components. One of these programs recently indicated that residual stresses may play a key role in the growth and arrest of stress corrosion cracks (SCC) in PWR piping components containing dissimilar metal butt welds. Residual stresses in these types of components typically arise from fabrication, fit up, joining, and repair processes. This talk will present a few case studies demonstrating the role of residual stresses on SCC initiation and growth in PWR and BWR components and conclude with a discussion on SCC mitigation activities using engineered residual stresses to potentially limit SCC initiation and growth in PWR components.