

Tube Sleeve Inspection with Eddy Current Array Sensors

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Heat exchanger and condenser tubes once sleeved are typically not inspected anymore due to the different probe fill-factors and probe traverse restrictions that may hamper the inspection and results of the eddy current examination. Therefore, the integrity of the installed sleeves, the underlying parent tubing, and the remaining section of the parent tubing is unknown. EPRI conducted research that was focused on providing inspection solutions by identifying and developing a single eddy current probe configuration and inspection techniques that can overcome the inherent fill-factor limitations of two different materials with different wall thickness and provide high confidence, reliable, and repeatable integrity assessments of the sleeve and parent tubing with the eddy current results. This probe must also be capable of providing the desired data quality for evaluations from both the sleeved section and parent tubing from a single data acquisition run. From the evaluations conducted by EPRI, the eddy current array sensors demonstrated optimal defect detection results for both the sleeves and parent tubing. Defects were detected in the sleeve, the expanded regions in the sleeve, tubing region behind the sleeve, and the remaining section of the unsleeved parent tubing in a single data acquisition run. Additionally, the array probe was able to distinguish between circumferentially and axially oriented flaws. The traditional bobbin coils did not have the sensitivity to detect defects in the regions that exhibited changes in geometry, such as in the expanded area of the sleeve and the area where the sleeve transitions to the parent tube. The presentation will provide the details of the completed research and results that now affords sleeves, underlying parent tubing, and the remaining section of the parent tubing to be inspected with high confidence with an eddy current array probe in a single data acquisition run.