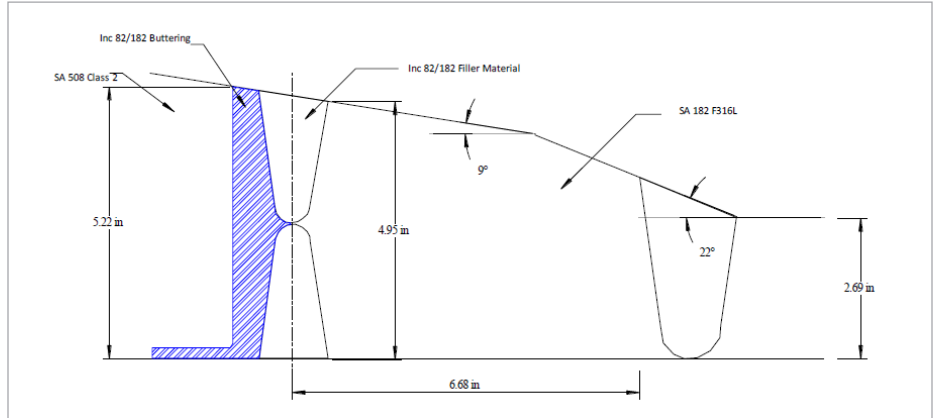


New Advanced PAUT Inspection Method

for Complex Geometry Dissimilar Metal Welds

CURTISS - WRIGHT

Nuclear Power Products and Services



PLANT TYPE

Nuclear Power Plant (PWR)

LOCATION

Southeastern United States

CHALLENGE

A nuclear power plant sought 100% volumetric examination coverage of dissimilar metal welds on their replacement steam generator. This is required per ASME Section XI and 10CFR50.55.

SOLUTION

To address this requirement, Curtiss-Wright developed an innovative examination procedure, LMT-PWI-DSMW-031: "Fully Encoded Ultrasonic Examination of Dissimilar Metal Piping Welds Utilizing Plane Wave Imaging (PWI) – Total Focusing Method (TFM)."

The new Advanced Phased Array Ultrasonic Testing (PAUT) Examination procedure does not impact inspection schedule and simultaneously offers substantial reductions in outage schedule, reduces human performance error, and reduces dose to plant personnel.

Background

A nuclear power plant in the Southeastern region of the United States experienced challenges in achieving complete volumetric examination coverage of complex geometry dissimilar metal welds attached to their replacement steam generator. Thorough inspections of nozzle to safe-end welds is required by ASME Section XI and 10CFR50.55.

In the past, the only qualified volumetric examination technique was conducted from the inside surface. This technique required entry into the bottom channel head of the steam generator with equipment that could be cumbersome within small, confined spaces. The impact to outage schedule and the required planning and resources were also of great concern to the customer.

Due to their extensive experience in nondestructive testing, Curtiss-Wright was invited to explore alternative qualified examination techniques. A collaborative, detailed feasibility assessment was conducted prior to the customer's next scheduled examination evolution.

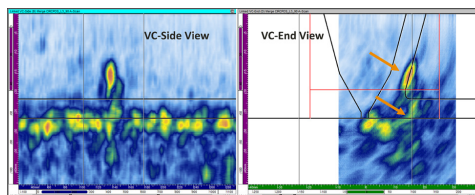


Image of circumferential thermal fatigue crack in dissimilar metal weld, detected with PWI-TFM technique

Results

Curtiss-Wright performed a detailed assessment which proved very favorable for reliable volumetric examinations to be performed from the outside surface. This would eliminate the need for personnel or equipment to enter the channel head.

Because of the overall outage impact and potential savings, the customer requested that Curtiss-Wright develop and qualify a reliable volumetric examination technique.

A procedure with Phased Array Ultrasonic Testing (PAUT) Examination technology utilizing Plane Wave Imaging (PWI) and Total Focusing Method (TFM) was developed and successfully demonstrated and qualified prior to the next refueling outage. This technique improved detection capability without signal distortion.

Examinations from the outside surface were conducted utilizing Curtiss-Wright's HALO delivery system achieving 100% volumetric coverage. There was zero impact on the customer's outage schedule, no human performance errors, and a significant reduction in accumulated dose.

The new LMT-PWI-DSMW-031 procedure can be utilized for external in-service inspections of complex configurations. It can be deployed in many instances beyond steam generators where conventional examination techniques are not feasible or do not provide the required inspection results.

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