

Jet Pump Assembly Inside-diameter Manipulating System

Background

The Jet Pump Assembly Inside-diameter Manipulating System (JAIMS™) was designed to improve the quality of examinations in boiling water reactor (BWR) nuclear power plants, while providing significant critical-path savings and mitigating radiation exposure to personnel during refueling outages. The JAIMS tool allows for ultrasonic inspections in parallel with fuel movement and reactor maintenance activities without interfering with other in-vessel operations that require the refueling bridges or auxiliary platforms.

The JAIMS provides optimal examination coverage and a reduced examination time. The BWR field services in-vessel ultrasonic manipulators minimize the requirements of overhead cranes, refueling bridges and auxiliary platforms, and can be used with a 360-degree platform installed. The JAIMS has been successfully demonstrated to support utility boiling water reactor vessel and internals project (BWRVIP) examination guidelines.



JAIMS performing jet pump diffuser and adapter weld exams

Description

The JAIMS tooling delivers phased-array ultrasonic techniques to provide maximum coverage of jet pump diffuser, adapter welds and mixer welds from the inside surface of the jet pump. The JAIMS tool can be deployed remotely via a remote-operated vehicle (ROV), which has proven to be a robust, reliable and flexible form of scan head deployment. The ROV is standardized as the Westinghouse all-purpose submersible platform (WASP™), which is used to deploy other in-vessel activities such as core-spray ultrasonic inspections.

In addition, the JAIMS system scan head can be deployed from a refueling bridge or 360-degree platform without the use of an ROV. The JAIMS encompasses several redundant motion axis to maximize manipulator flexibility, while also serving as built-in contingencies to provide reliability.

Benefits

Westinghouse customers benefit from the JAIMS in the following ways:

- Critical path savings and unparalleled scheduling flexibility
- Inspections performed in parallel with fuel moving and other in-vessel activities
- Best-in-class data quality and coverage for accurate results and flaw characterization
- Modular and flexible design accommodates various plant configurations
- Minimized need for continuous tool monitoring by personnel and cameras, which frees up valuable 360-degree platform or refueling bridge space for other in-vessel activities
- Built-in contingencies to minimize potential failure mode effects
- Minimized project delivery crews in support of cost reduction and as-low-as-reasonably-achievable goals
- Minimized human manipulation of equipment reduces dose exposure and human performance errors
- Maximized BWRVIP inspection-cycle intervals
- Standard platforms for electrical, pneumatic and hydraulic motion control, ultrasonic systems, WASP remote-operated vehicle, cameras, communications and standard refueling equipment
- Standard platform for cross utilization of spare parts, cost control and personnel knowledge
- Proven history results including zero system or tool failures on a first-of-a-kind inspection tool deployment

Experience

The JAIMS was deployed at a U.S. nuclear power plant in September 2010 during a refueling outage. The JAIMS system tool performed as designed with zero system or tool failures and completed the contracted examination scope in two-and-a-half days of the planned five-day schedule.

The JAIMS examination performance features full phased-array capability, an industry first for ultrasonic examination of jet pumps from the inside diameter surface. The JAIMS was nominated for a Top Industry Practice (TIP) and Platt Global Energy award in spring 2012.

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