

RPV Head Inspection – Ligaments and Circumferential Welds

Combined ultrasonic and visual inspections system for RPV head ligaments, junction of head to nozzles and shell weld

Reactor pressure vessel (RPV) head inspection with sophisticated phased array ultrasonic technology: material testing for cracks or defects, for ligaments and for longitudinal and transversal defects in the shell welds

Challenge

Closely attached nozzles on top of the RPV head and the spherical geometry of the head require small high-precision tools. Neither varying dimensions nor the different rail systems and attachment parts on site may have an impact on the inspection results. At the same time international standards and regulations (e.g., ASME, KTA) have to be fulfilled.

Solution

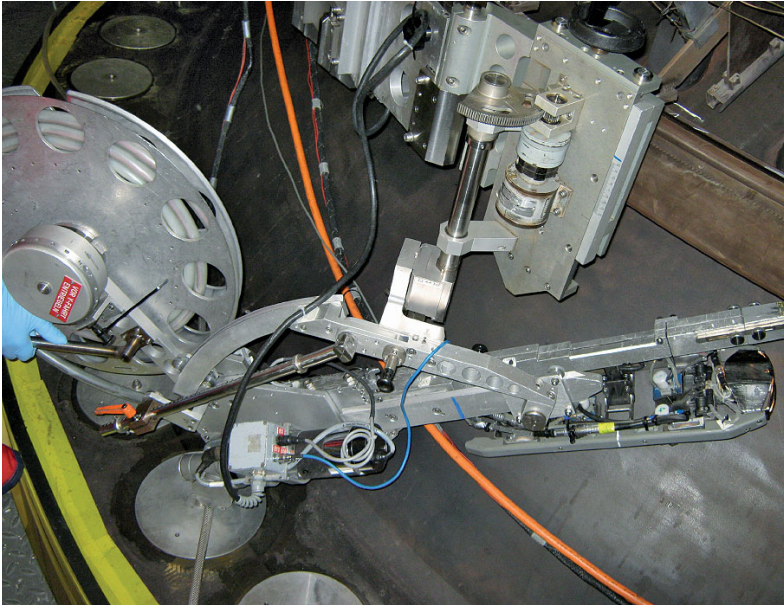
Framatome provides a combined ultrasonic (UT) and visual testing (VT) system for the RPV inspection. This examination covers as much of the ligament material as possible. At the same time, a visual inspection of the head for crystallized residuals and stains is possible. The preparation and inspection from one single source minimizes the inspection time. The combination of UT and VT inspection techniques reduces the radiation exposure.

Features

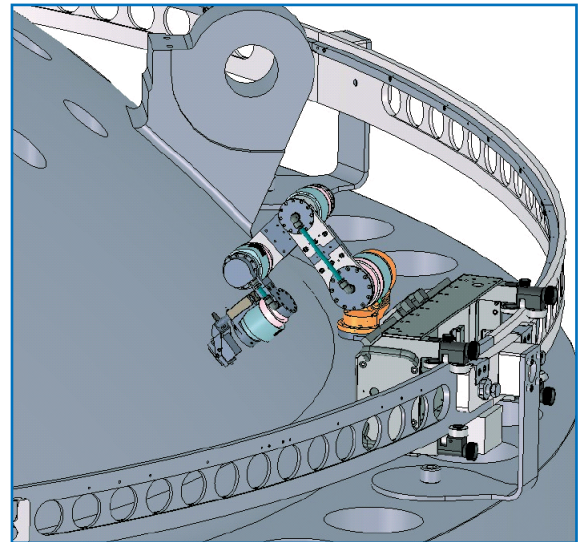
- Combined UT and VT inspection during the ligament examination with confined space
- Small transducer (adaptable to the site requirements)
- Inspection feasible with or without guiding rails
- Complete examination of each inspection lane with just one run
- Short set-up and preparation time: about 1 day
- Integrated camera for VT and monitoring
- Reliable, transferable and reproducible results
- Self-guiding transducer tool for inspection areas without guiding rails between nozzles
- Detection of cracks or defects with UT (ligament inspection) by using creeping waves and various shear waves
- Detection of crystallized residuals on the surface with VT (ligament inspection)
- SAPHIR^{plus} UT device with up to 112 channels for phased array and conventional probes

Why Framatome?

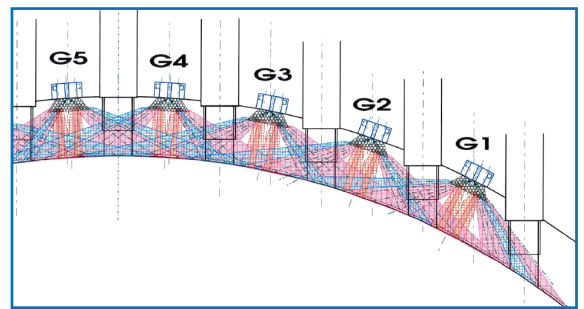
Framatome has long-standing experience with nuclear and conventional head cover inspections even with complex geometries. We can refer to many head inspections, successfully executed under various site and object conditions.



RPV head ligament manipulator



Robotic arm for complicated geometries inspecting a head cover weld



Inspection areas at RPV head ligaments

Customer benefits

- Long experience in non-destructive testing and robotics
- The single source supply minimizes the risks for the customer
- Compatible to different types of head covers for pressurized water reactors
- Sophisticated inspection techniques according to actual regulations

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