

RPV Inspection from ID with CMM Manipulator for complete vessel examination including UT, ET, VT

The CM manipulator combines different inspection techniques and allows to perform a full vessel examination in short time. Independency of the site infrastructure allows to process different activities in parallel.

The Challenge

The reactor pressure vessel (RPV) examination is usually on the critical path of the power plant's outage. Inspection requirements of the applied codes (e.g. ASME, KTA) have to be fulfilled. As the schedule is tight, short crane and pool occupation are necessary to avoid adverse effects on other activities.

The Solution

- Framatome provides the central mast manipulator (CMM) for ultrasonic testing (UT), eddy current testing (ET) and visual testing (VT) in one manipulator system. The cladding can be inspected either with UT or ET or VT.
- Thus enables a short vessel occupation time (between 4 and 5 days) depending on the applied code (KTA, ASME).
- The polar crane is used only for installation but kept available for other activities taking place in parallel.
- During the inspection no other auxiliary devices are necessary.
- The coupling of UT probes is also possible with running water for simultaneous work in the primary circuit, e.g. steam generators.



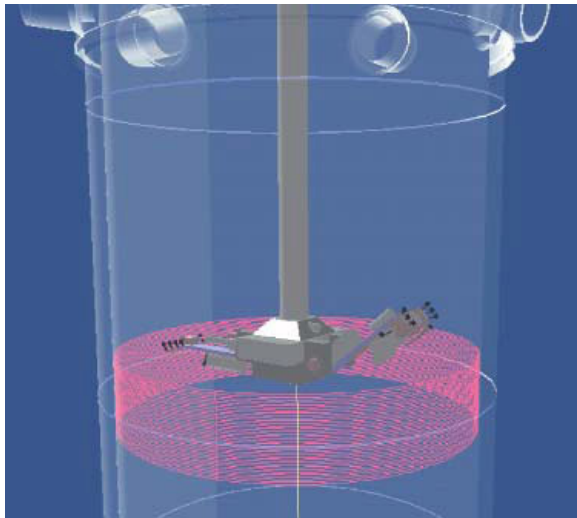
Installed CMM

Features

- UT, ET, VT all with one manipulator
- Different RPV diameters feasible without modification
- 3 main components (manipulator, cable storage and mast segments) are assembled on site
- Overall accuracy less than 3 mm, repeatability less than 5 mm
- Scan speed up to 100 mm/s depending on the inspection technique
- 5-axis manipulator to cover the entire inner surface of the RPV if desired → scan volume: full coverage
- Easy probe system change with quick release system
- Lockable electric drives to reduce inaccuracies
- Protected against water ingress up to 30 m water head
- Phased array and conventional probes used for optimal inspection
- Identification of scratches, grindings and irregularities in the cladding and distinction from cracks and defects with multiple test frequencies and advanced mixing algorithms
- Flexible verification with UT- or VT technique possible
- Up to 336 channels UT instrument
- Mechanized units for e.g., hardness measurements, sample taking or abrade optional applicable
- Online data evaluation through projections from 3 different view possibilities

Why are you in good hands with us as a partner

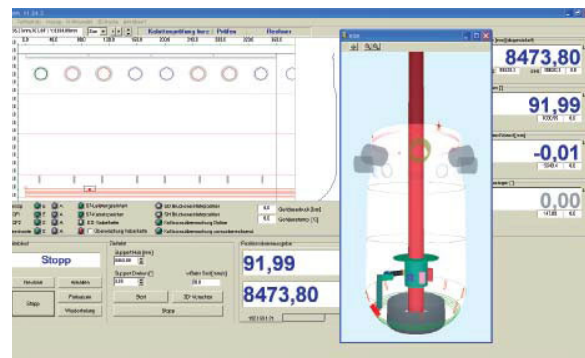
Framatome provides complete service packages based on more than 30 years experience in non-destructive testing (NDT). Our portfolio ranges from single inspections up to multi-annual support or tailor-made solutions to the best benefit for our customers.



Simulation of inspection zone coverage



Installed CMM system



CMM control software

Your benefits at a glance

- Significant experience from over a hundred reference inspections worldwide
- Complete inspection with one system
- Qualified according to several worldwide used NDT standards
- Appropriate for all reactor types, from small pressurized water reactors (e.g., WWER 440, WWER 1000) to biggest plants (e.g., KONVOI, N4, EPR)

Contact:

examination@framatome.com

www.framatome.com

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