Inspection Qualification II

New ENIQ qualified Eddy Current Inspection Technology for detection and differentiation of Stress Corrosion Cracking (SCC) in large austenitic valves
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SUMMARY

A new eddy current inspection system has been developed and ENIQ-qualified to inspect a large number of probably damaged large austenitic valves (ID 80 to 530 mm).

THE INSPECTION TASK

In addition to the classic inspection technologies VT and PT another NDE system was urgently needed to separate small surface pit corrosion from deeper SCC-defects. Based on integrity calculations a maximum defect depth of 2 to 3 mm was defined. All defects deeper than these limits or with underneath cracks have to be detected, see figure 1. The inspection areas are the sealing surfaces of the valve housing and the pressure seal cover.

Figure 1 - Sketch of the general inspection task

This eddy current tool offers a deeper look to the surface and underneath the surface of non-ferrite objects to get more information about the integrity of the component. Parameters and inspections task of this eddy current system could be changed by the ec-works team in a very short period.
THE DEVELOPMENT AND QUALIFICATION OF THE EC-WORKS EDDY CURRENT SYSTEM

Test and Calibration blocks have been designed and manufactured. The inspection system has been tested and developed with the use of these artificial defects, refer to Figure 2. After the laboratory tests, measurements at real defects have been done to check the capabilities of the system. After further developments and improvement of the inspection-system was set to operation after only 5 month of research and development. The qualification of this system was done in accordance to the ENIQ Rule: European Methodology for Qualification, category 3 (real defects at real systems).

During this qualification process at least 15 valves have been tested, see an example in figure 3. In two cases the eddy current inspection had detected cracks underneath corroded areas, these cracks had not been detected by the other performed inspections or their results had not been evaluated as critical. In all other trials the Eddy Current and the VT and VT inspections came to equal evaluations and results.
Figure 3 - Austenitic casted valve
The eddy current inspection offers additional safety regarding the integrity of the inspected systems and verifies the results of the surface related technologies.

THE INSPECTIONS

At least more than 150 inspections have been done during the last 10 month at a nuclear power station in Germany; figure 4 illustrates one set-up of the system. At 25 of the 150 inspections defects have been detected and reported. 5 of these have been only evaluated as “defect” by the eddy current inspection.