

5.1.3. RSE-M QUALIFICATION OF AN ULTRASONIC INSPECTION SYSTEM FOR THE EXAMINATION OF PRIMARY PIPE BRANCH NOZZLES INNER SURFACE

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This paper describes the qualification process, technical difficulties and solutions developed by Doosan Babcock during an exercise to develop a qualified inspection system for the examination of a series of different geometry branch nozzles (internal wall) in the primary pipe work of PWR plant.

The project covered the development and qualification of an ultrasonic inspection system using phased array probes, to examine the inner radius and bore region of the branch nozzles with the primary pipe. The aim of the inspection being to detect and characterise thermal fatigue cracks emanating from these regions.

Doosan Babcock was contracted by EDF to develop and qualify under French RSE-M rules an ultrasonic inspection system capable of reliably detecting and characterising such defects.

A wide range of factors have an influence on the inspection performance, for example, manufacturing and design differences between nozzles, geometry of available inspection surface, the impact of the saddle effect on inspection geometry, irregular surface condition, range of defect positions, austenitic structure, presence of austenitic welds as well as difficult access considerations.

This paper explains the phased array approach to the qualification exercise adopted by Doosan Babcock. It covers both the theoretical approach to inspection design, probe characterisation and the theoretical and practical methods used to assess the impact of the influential inspection parameters and to verify performance and it describes the RSE-M qualification process applied.