framatome

ATHENA

Neutron Fluence Analysis

Framatome supports BWRs and PWRs in neutron fluence analysis. Continuous investment in fuel engineering technologies provides best-estimate methodologies.

Challenge

The nuclear industry is facing continuously increasing safety authority requirements alongside an aging fleet . The lifetime of a plant directly depends on the neutron fluence of the reactor pressure vessel and its inner components.

In case of sensitive areas, core loading, optimizations may require best-estimate neutron fluence calculations to be displayed in a highly detailed geometric model.

Traceability of the chain from core loading pattern to neutron fluence results and the incorporation of measurement values of surveillance programs and of monitoring systems, are key for the approval of licensing documentation.

Solution

Framatome has set up the ATHENA system, which connects core design calculations and detailed MCNP® models independently of reactor and fuel type.

Plant-specific result evaluation allows fluence investigations of reactor pressure vessel, belt line welds, welds of flanges, in-core and ex-core detectors, surveillance capsules, and more.

The cycle-wise investigation also allows the forecast of the fluence trends, and can be used in the optimization of the core loading strategy and shielding measures regarding neutron fluence.

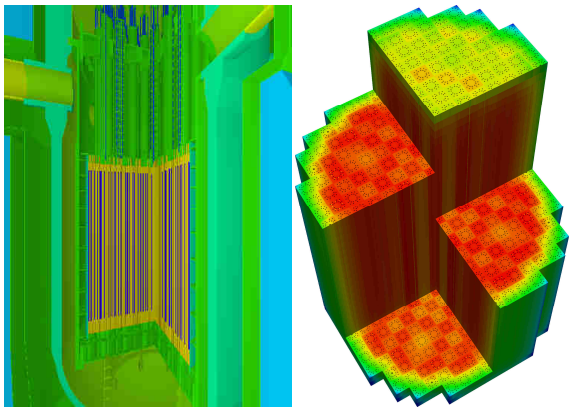
Customer benefits

Customer directly benefits through asset life extension facilitated by the following:

- Neutron source input based on core design calculations
- Plant specific MCNP® model for best-estimate calculations
- Plant-specific data evaluation and result visualization
- Documentation in cycle-specific neutron fluence report

Your performance

is our everyday commitment



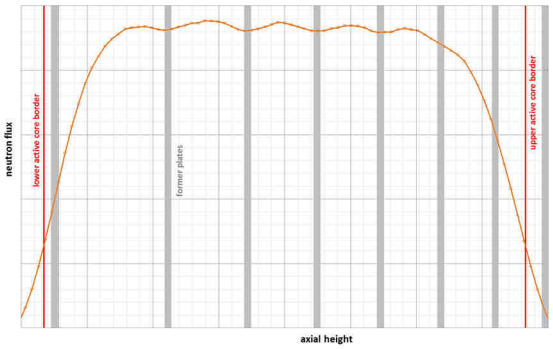


Fig. 1: High resolution neutron fluence results

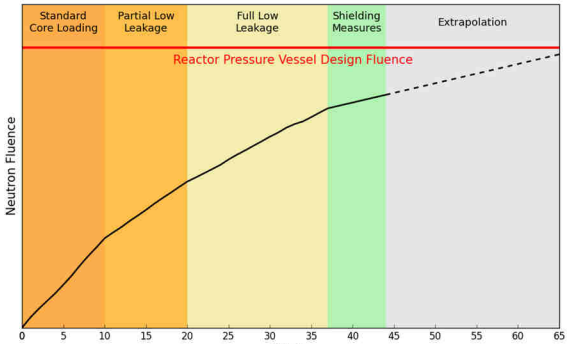


Fig. 2: Maximum neutron fluence over plant lifetime

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