framatome

FAMOS-FCG

Fatigue Crack Growth (FCG) under real loads

The high-accuracy Fatigue Crack Growth (FCG) module provides the basis for simulating fatigue crack growth, optimizing inspection intervals and applying advanced damage tolerance concepts.

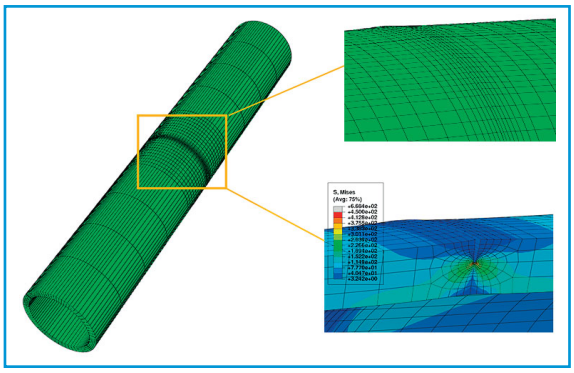
Challenge

Ensuring the safety of nuclear power plants is crucial under all types of loads. It's vital to monitor and manage any degradation effects that could impact the plant's safety and operational functions. Cyclic Thermo-mechanical loads can cause fatigue, speeding up the ageing process of equipment. Since fatigue is a major ageing mechanism, it can lead to unexpected incidents like equipment damage, leakages, and unscheduled shutdowns. Establishment of a fatigue management program is demanded for licensing or long-term operation of reactors and must meet increasingly strict regulations and design codes. Accurately assessing Fatigue Crack Growth is essential for remaining fatigue life estimation, optimization of inspection intervals and the application of damage tolerance concepts.

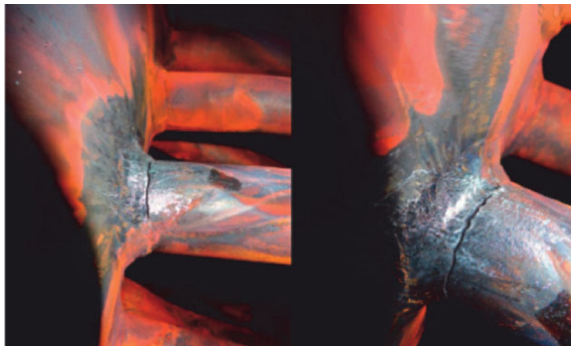
Solution

FAMOS-FCG, offers real-time assessment of the remaining life of structures subjected to macroscopic Fatigue Crack Growth. This tool is a part of Framatome's high-accuracy local load monitoring system, FAMOSi, which is integrated into the Advanced Fatigue Solution (AFS) suite. A significant advancement in this product family is the FCG module, which provides cycle-by-cycle simulation of local fatigue crack growth using proven design code procedures like the ASME Code Case 809. It calculates actual fatigue crack lengths with precision, aids in estimating remaining fatigue life, optimizes inspection intervals, and implements damage tolerance concepts.

Utilizing process data and measured local thermal loads, the "Fast Fatigue Evaluation" (FFE) module determines the stresses perpendicular to the crack over time. These stresses are crucial for determining stress intensity factors. The application of a rainflow counting algorithm enables the calculation of stress intensity factor ranges and the corresponding fracture mechanics assessment. FAMOS-FCG is customizable to meet the specific needs of each customer.



Exemplary fatigue crack configuration



Component fatigue crack growth in technical structures

Customer benefits

- Real time assessment of the remaining life duration of structures
- Realistic computation of fatigue crack growth
- Optimization of maintenance and inspection costs
- Cost savings through plant lifetime extension and through the increase of plant availability
- Basis for the application of damage tolerance concepts

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is **our** everyday **commitment**

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