Seismic Margin Assessment

Plant-Level Safety Assessment for Extreme, Beyond-Design Seismic Events

Framatome offers comprehensive and reliable seismic safety evaluation, integrating multi-disciplinary expertise and state-of-the-art analysis tools.

Challenge

In many countries, the safety authorities have reviewed their requirements with respect to the seismic hazard. Therefore, safety authorities are now pushing either for a re-evaluation of the design requirements or for the plant-specific analysis of the consequences of beyond-design-basis seismic conditions. In particular, utilities are requested to provide margin assessments taking into consideration possible cliff edge effects.

Solution

The seismic margin methodology is designed to demonstrate sufficient margin over the safe shutdown earthquake (SSE) to ensure plant safety and to find any “weak links” that might limit the plant’s capability to safely withstand a seismic event larger than the SSE. Based on the fragility analysis of systems, structures and components (SSCs), a reliable indicator of the maximum seismic capacity of each SSC is derived, the so-called HCLPF-value (high confidence of low probability of failure). Integration of fragility/capacity data with system analysis permits the evaluation of the plant capacity.

Our long-standing, multi-disciplinary expertise ranges from soil/building dynamics to vibration analysis and testing of all relevant types of equipment, including probabilistic safety analysis (PSA). This leads to high-quality, plant-specific solutions, complying with the international state-of-the-art.

Customer benefits

- Strong expertise and references in seismic design and margin evaluation of nuclear power plants
- Accurate assessment of the margins required to document safety authorities’ expectations
- Synergies between involved technical disciplines, combining analytical experience with know-how specific to individual component classes
- Identification of strengths and weaknesses for key systems
- Optional assessment of the core damage frequency calculation based on existing probabilistic hazard curves

Technical information

- Seismic fragility/robustness assessment for key SSCs: civil works, primary circuit, reactor pressure vessel internals, fuel, safeguard systems, pumps, tanks, spent fuel pool, electrical and instrumentation and control systems, distributed systems (piping, heating, ventilation and air-conditioning systems, cable trays), special equipment (fuel racks and handling machine, cranes)
- Integration with PSA for assessment of strength/weakness of key systems
- Specific tools for each link of the analysis chain (e.g. SASSI, SOFISTIK, ANSYS, Risk-Spectrum)
- Compliance with international codes, guidelines and standards (e.g. IAEA, ASCE, ASME, RCC-CW, EPRI)

Contact: seismic-retrofit@framatome.com

www.framatome.com

It is prohibited to reproduce the present publication in its entirety or partially in whatever form without prior written consent. Legal action may be taken against any infringer and/or any person breaching the aforementioned prohibitions. Subject to change without notice, errors excepted. Illustrations may differ from the original. The statements and information contained in this publication are for advertising purposes only and do not constitute an offer of contract. They shall neither be construed as a guarantee of quality or durability, nor as warranties of merchantability or fitness for a particular purpose. These statements, even if they are future-orientated, are based on information that was available to us at the date of publication. Only the terms of individual contracts shall be authoritative for type, scope and characteristics of our products and services.