

Comprehensive PWR Fuel Engineering Services

Challenge

In today's nuclear industry, utilities continue to seek ways to operate more efficiently. In order to optimize plant operations and determine ways to operate more aggressively, high resolution analytical tools are in increasing demand.

Solution

Framatome offers a wide range of analytical capabilities and technology tailored to its specific customers' needs. With more than 45 years of experience, our global team provides responsive, reliable solutions. We offer a full scope of engineering design, licensing, and operational support for reload cores. Framatome maintains and develops codes and methods for design and analysis of Light Water Reactor (LWR) fuel. NRC-approved codes are employed to develop innovative incore fuel management plans to perform reload safety evaluations and related analyses that support licensing. Support is provided for reactor operating cycle lengths ranging from 12 to 24 months as well as extended power uprates.

Customer benefits

- The global resources of a world leader in nuclear energy
- Utilization of the latest approved code systems for analyses
- Licensing support for fuel storage racks
- A broad range of structural, thermal, and nuclear engineering capabilities
- Technology transfer packages tailored to specific customers' needs
- Startup physics consultation saving both time and money



Your performance
is **our** everyday **commitment**

Reactor Engineering Analysis & On-Site Support

Startup Physics Testing

Framatome engineers support on-site startup physics testing by performing the tests on our state-of-the-art reactimeter systems. Our experience spans a variety of PWRs across the globe. We combine the proven success of over 250 reload startups with innovative consultation resulting in reduced testing time, accurate test results, and cost savings for our customers.

Core Monitoring

Backed by the strength of world-wide core monitoring experts, our methods support monitoring PWR cores that utilize either fixed or moveable in-core detectors. The flexible design of our codes allows different neutronic engines and customization of surveillance modules to meet specific utility needs. Predictive modules help plan for future maneuvers in the safest and most economical manner.

Technology Transfer & Training

Most of our fuel-related analysis technology is available to utilities that wish to develop or enhance their own in-house capabilities. We can tailor technology transfer packages to meet the specific needs of any customer.

Criticality Analysis

Our proven tools and methods have been extensively tested and benchmarked to current standards required for criticality analysis, including burnup credit.

Fuel Storage Racks – Using a company-wide network of criticality experts, we bring broad experience to unique and challenging licensing efforts for existing fuel storage racks that support design, analysis, and licensing.

Fuel Storage and/or Shipping Containers & Casks – Framatome supports licensing for a variety of fuel storage casks and shipping containers. Applications range from LWR fuel shipping containers and on-site storage casks to shipping containers for highly enriched fuel rods.



Scan to learn more or visit
http://www.framatome.com/EN/us_platform-812/framatome-u-s-fuel-reliability.html

Chemistry & Crud Risk Assessment Tools

Framatome addresses Crud Induced Power Shift (CIPS) and Crud Induced Localized Corrosion (CILC) risks through the use of a multi-tier risk assessment program such as the one suggested by EPRI's Crud and Corrosion Guidelines. For complex analyses, the CILC results include the effects of crud thickness, under-deposit cladding temperature, evolution of CILC bearing species, and lithium concentration in the zirconium oxide layer. The CIPS results are generated from the core boron loading using a cycle-specific Neutronics impact assessment.

Structural & Seismic Analysis

Framatome structural engineers apply their expertise in a wide range of products — from detailed stress analysis of fuel components to complete structural/seismic analysis for spent fuel storage racks and pools. Services are available to provide consultation and support in the following areas:

Structural Analysis

Featuring expertise in the areas of elastic, plastic, and buckling analyses; fatigue and fracture mechanics; mechanical and thermal creep; ASME B&PV Code Section III analyses.

Dynamic Analysis

Featuring expertise in the areas of in-reactor seismic/LOCA evaluation of fuel, including consideration of effects of irradiation (NRC IN 2012-09); seismic evaluation of spent fuel storage racks and pools; fuel fragility support for seismic PRAs; fuel assembly distortion modeling, prevention, and assessment, including explicit control rod drop analysis; physical modeling and assessment of grid-to-rod fretting under flow induced vibration and jet-impingement; fuel assembly handling & drop analysis; fluid-structure interaction.

Testing

Full range of mechanical and thermal-hydraulic testing capabilities relevant to the characterization and evaluation of fuel designs, including pressure drop, flow-induced vibration, wear behavior, and control rod drop. Some of these testing capabilities are available for on-site evaluations. In addition to these capabilities, Framatome has ready access to an extensive, global testing database related to complex physical phenomena corresponding to in-reactor conditions.

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