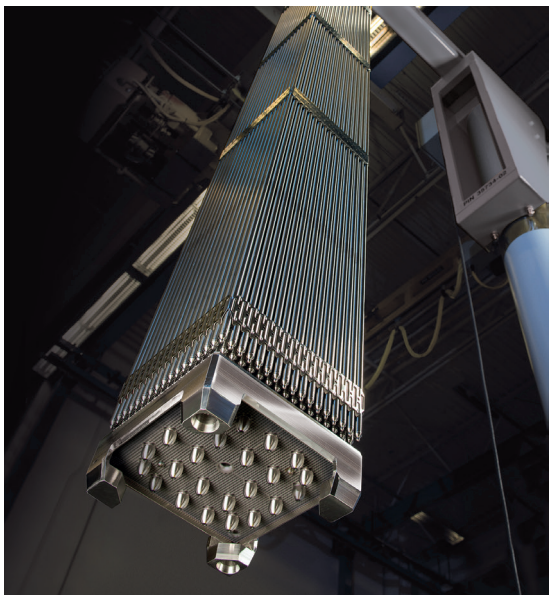
framatome

GAIA Fuel Assembly

Framatome's GAIA fuel assembly enhances safety, reliability, and fuel economics in PWR operations through advanced materials, superior GTRF resistance and optimized thermal-hydraulic performance.



Challenge

PWR operations are increasingly demanding and include power uprates, significant increases in burn-up, lower neutron leakage, cycle lengths up to 24 months and challenging water chemistry conditions. With plants challenged to improve fuel cycle economics, there is also an increased demand for higher fuel utilization.

All of these factors affect the available margins of the fuel assembly which means that while fuel must remain robust against Grid-To-Rod-Fretting (GTRF), historically the most frequent cause of fuel failure in PWRs worldwide, it must also enhance thermal-hydraulic performance.

Solution

Developed to meet the increasingly demanding requirements of PWR operations, the GAIA fuel assembly ensures the safety and robustness of fuel operations while offering optimal performance and a high burn-up capacity based on proven designs.

The GAIA spacer grid is an evolutionary step in design, combining the unsurpassed robustness and resistance to GTRF of HTP designs with the superior thermal-hydraulic performance of Framatome's vaned spacers. GAIA fuel assemblies utilize $M5_{Framatome}$ advanced cladding which offers superior margins and meets anticipated changes in U.S. regulatory requirements.

The innovative GAIA fuel design offers utilities cost savings through its high mechanical fretting resistance, improved thermal performance, better debris filtering efficiency and improved fuel utilization.

Customer benefits

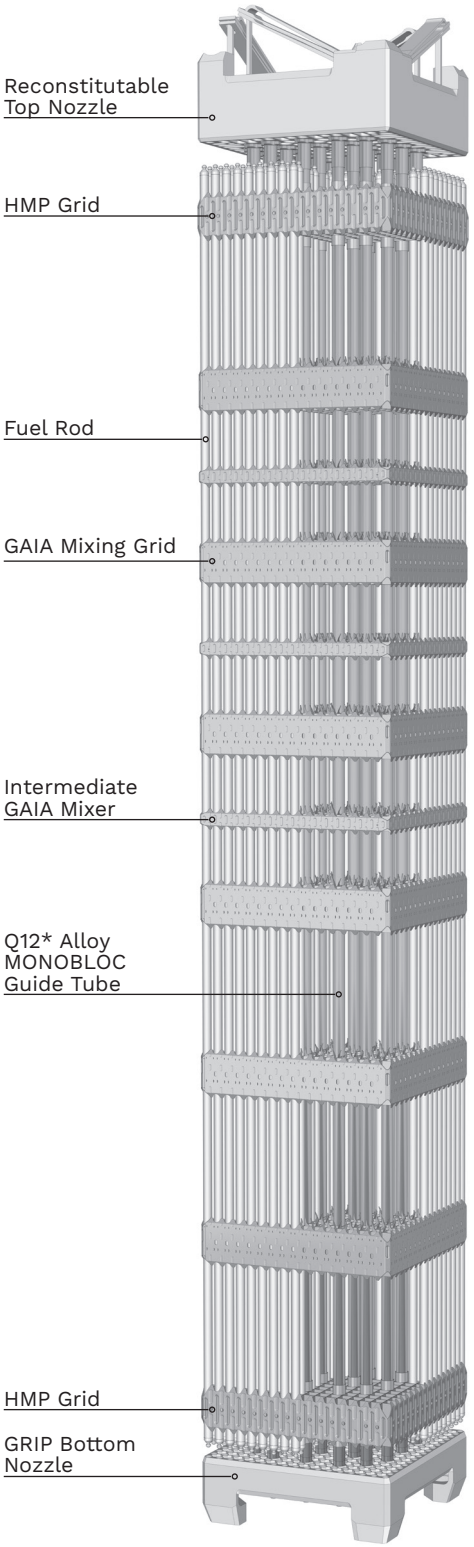
Enhanced Reliability and Robustness

- Superior rod supports ensuring protection against GTRF
- Increased margins against incomplete rod insertion and fuel assembly distortion
- Superior debris filtering efficiency

Increased Flexibility

- $M5_{Framatome}$ excellent corrosion resistance enables higher burn-ups and extended fuel cycle operation
- Enhance operating flexibility
- Chamfered pellets reduce the risk of chipping and increase margins

Improved fuel cycle economy



GAIA Key Features

High Thermal Performance & Fretting Resistance

- The GAIA spacer combines the mixing principle of Framatome's vaned spacers (Mk-BW, AFA) with the fretting resistance of the HTP spacer, resulting in a significant advancement in spacer design.

High Debris Filter Efficiency

- The GRIP bottom nozzle combines features of Framatome's TRAPPER and FUELGUARD designs, resulting in improved filtering efficiency.

High Grid Stability

- The GAIA spacer has a favorable deformation mode under lateral loads leading to excellent behavior even under seismic conditions.

High Fuel Assembly Dimensional Stability

- Guide Thimbles (GT) are made of Q12 material with increased creep resistance
- Increased guide thimble outer diameter and reinforced GT-to-grid connections increase cage lateral stiffness, providing improved resistance to fuel assembly distortion and reduced stresses in the guide thimbles

Flexible Fuel Management and Low End-of-Life Pin Pressure

- GAIA fuel rods are made of $M5_{Framatome}$ cladding, with options for chromia doped fuel and a reduced pellet-to-cladding gap for increased loading

Scan to learn more.

NOTE: Assembly depicted is the 12 ft. GAIA design

*Q12 is a quaternary alloy derived from $M5_{Framatome}$: Tin and Iron are added to Zirconium and Niobium in order to improve the creep behavior under operating temperature and irradiation, while maintaining high corrosion resistance.

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