framatome

Ultrasonic Fuel Cleaning

Creating cleaner, better-performing fuel with safer methods

Challenge

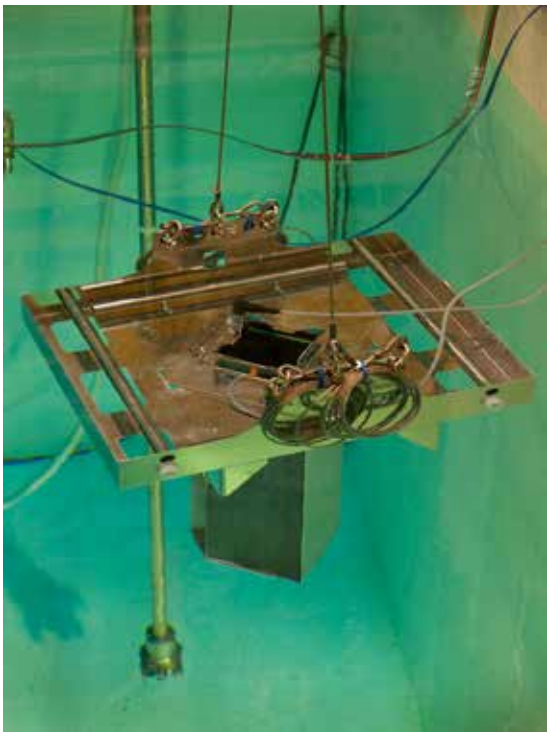
Utilities are constantly seeking ways to increase the performance and utilization of their fuel. Corrosion products from fuel assemblies are primary concerns. Additionally, with safety always top-of-mind, cleaning fuel with less dose exposure for teams and decreasing dose rates for components would be ideal. However, the installation and filter systems must be customizable depending on the plant's needs.

Solution

Provide Safe, Clean Nuclear Energy
Framatome offers Ultrasonic Fuel Cleaning (UFC) services to preclude axial offset conditions that affect fuel performance and to effectively remove corrosion products (crud), reducing source term and personnel exposure. Proven in dozens of applications, UFC also reduces dose rates on primary components contaminated by the migration of activation products from core surfaces.

Innovative Method Effectively Removes Fuel Rod Deposits
UFC was developed to manage or eliminate in-core flux depression by removing deposits from fuel assemblies during refueling outages. Ultrasonic waves cause small particles of deposits to release from the fuel assembly. Fuel coolant water transports displaced particles to highly efficient filters where they are collected for final disposal, minimizing fuel handling.

Plant Specific Installation Designs
Framatome currently deploys one BWR UFC system, one PWR UFC system and one new "next generation" High Efficiency UFC (HE-UFC) system based on the utility's plant type and specific installation needs. The BWR system is typically installed in the reactor vessel or cask storage pool. The PWR UFC system is typically installed in the transfer canal or cask storage pool. The HE-UFC system has a variety of installation designs.



HE-UFC with Four Face Camera Brackets

Customer benefits

- Improves fuel utilization
- Reduces source term and primary system dose rates
- Extendable to non-Framatome fuel designs

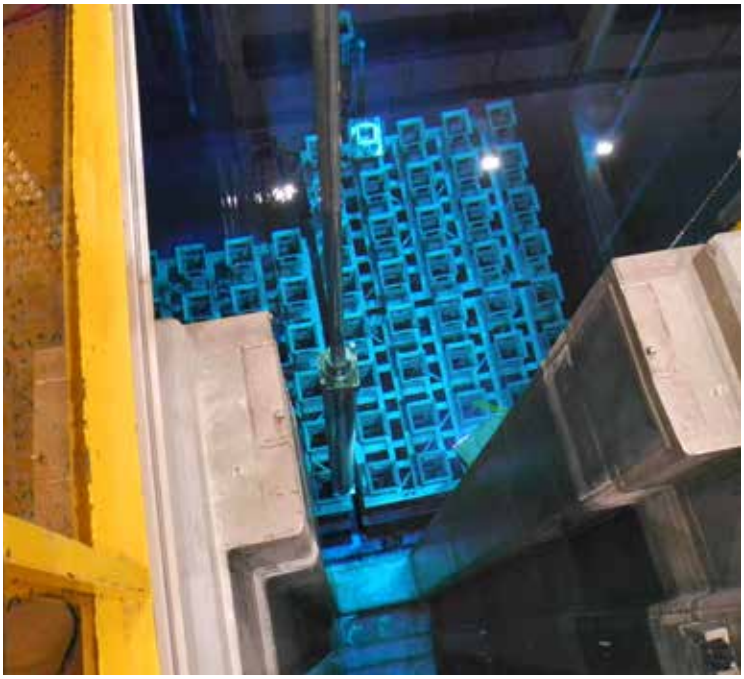
Your performance
is **our** everyday **commitment**

Features

- Pellet and cladding vibrations during cleaning are bounded by the vibration the fuel rods experience during operation in the core
- Removes deposits from fuel surfaces

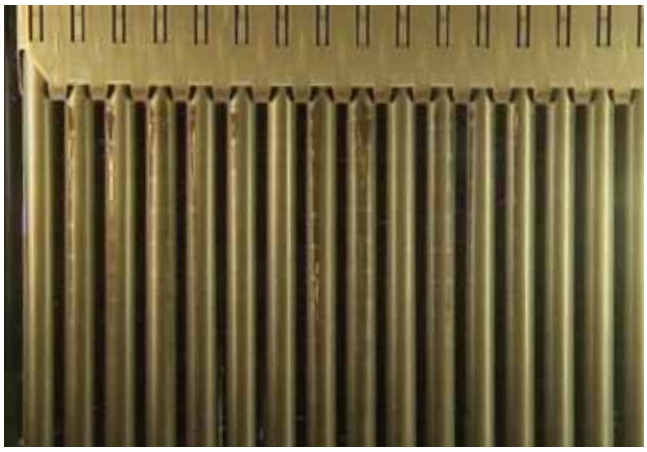
Disposable or Reusable Underwater Filters Capture Removed Deposits
Underwater filters capture removed deposits while maintaining radiation to acceptable levels. Filtration system designs are available to provide custom optimization tailored to each plant's specific needs. Filter options range from plastic filters used for short-term pool storage to fuel assembly size metal filters used for long-term pool storage and reuse.

Reliable Console Controls the Process; Enables Easy Observation
An operating console, located on the refuel floor near the edge of the spent fuel pool or reactor cavity, controls the process. The operator can easily observe the cleaning parameters and performance of the filtration unit.

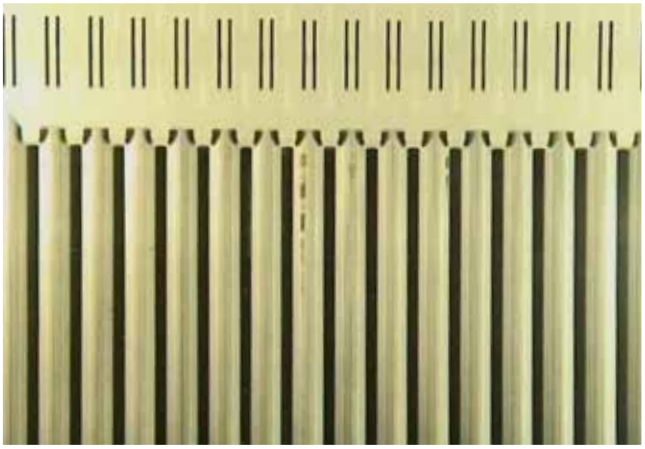


AM/FM Filter
(Fuel Assembly Size Metal Filter)

Cleaning Efficiency



PWR Fuel Assembly Span 5 — Before HE-UFC



PWR Fuel Assembly Span 5 — After HE-UFC

BWR UFC

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