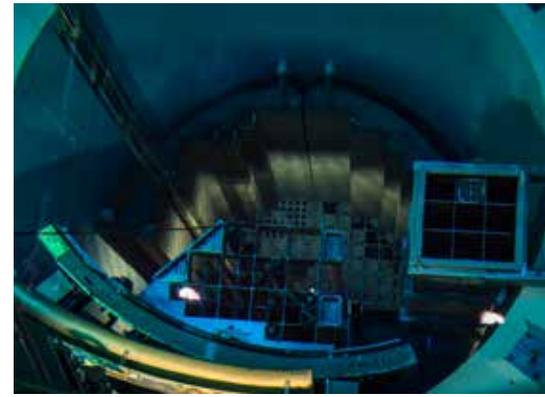




framato

PWR Services



## Challenge:

One of utilities' top priorities in the 21<sup>st</sup> century is securing operational excellence. Tangible results that ensure safety, quality, performance and delivery are paramount. Your teams can count on Framatome to deliver innovative solutions that:

- Increase task safety and efficiency
- Reduce cost, dose and time on critical path
- Resolve emergent issues quickly
- Improve plant performance

## Solution:

Framatome's PWR Reactor Services team prides itself on an unwavering commitment to achieving operational excellence. Considering it a constant journey, our team continually looks for new ways to raise the bar on performance. With accountability, customer focus, and self-assessments at the heart of our culture, we seek to maintain a focus on process, efficiency, effectiveness improvement, and professional development for our personnel. Our team places a daily emphasis on performance-driven services, planning and readiness, a commitment to training, and continuous innovation. And it's these key elements that serve to motivate our personnel to help you — our customer — succeed.

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

## Alignment with Industry Standards and Expectations

The Framatome PWR Reactor Services team has a variety of programs in place — at all levels — to ensure alignment to industry standards and to your expectations.

- Operating experience and lessons learned coordinators “Striving for Excellence”
- Supervisors Staying in Role
- Human Performance Observation Program
- “Standards of Operational Excellence” reference guide
- Fuel handling expectations and standards
- High Stakes Field Leadership Training



**Safety.** First and foremost, the critical success factor for our people, products and services.



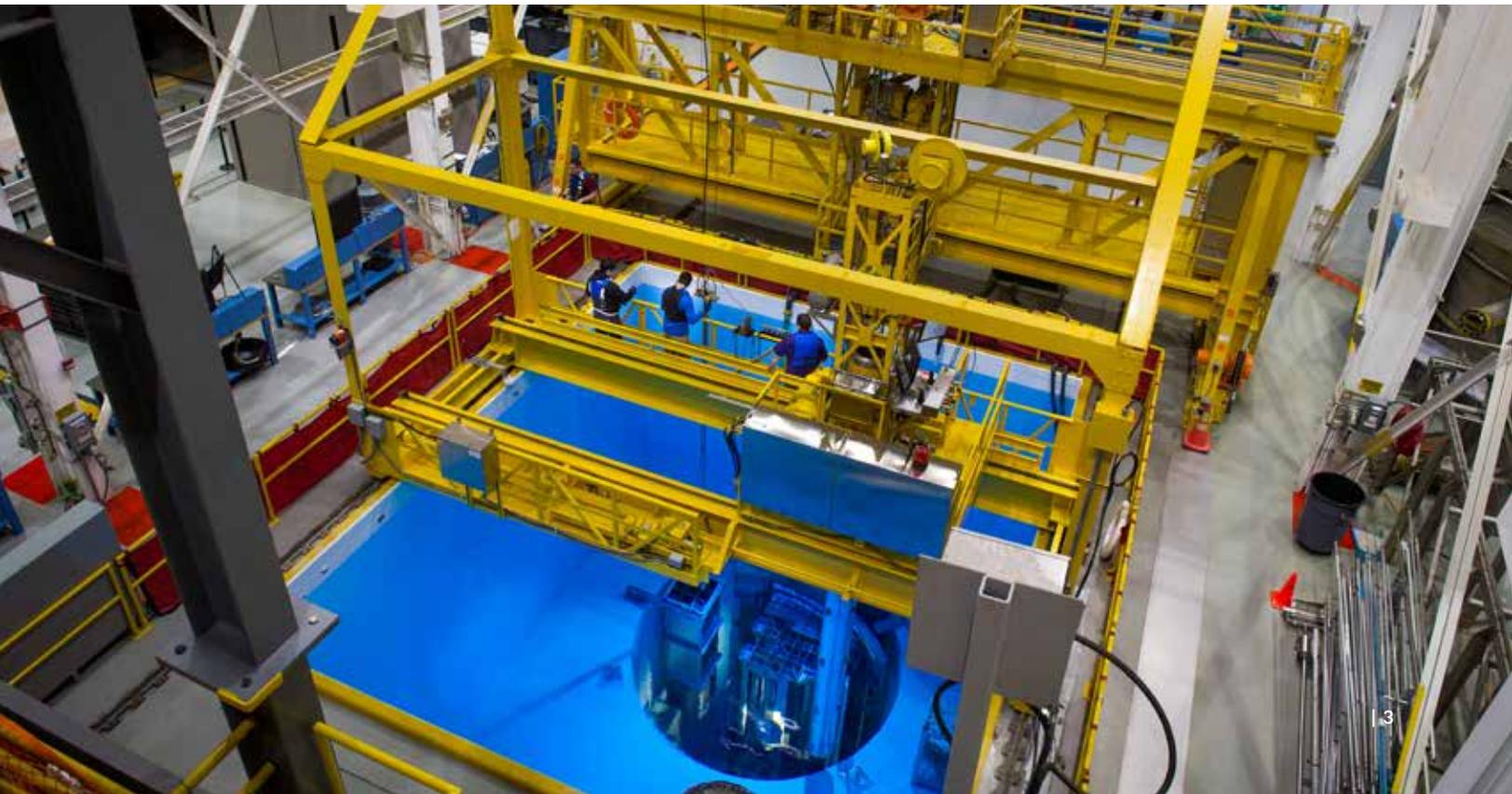
**Performance.** Fueled by our people and innovation for our customers.



**Quality.** First time, every time.



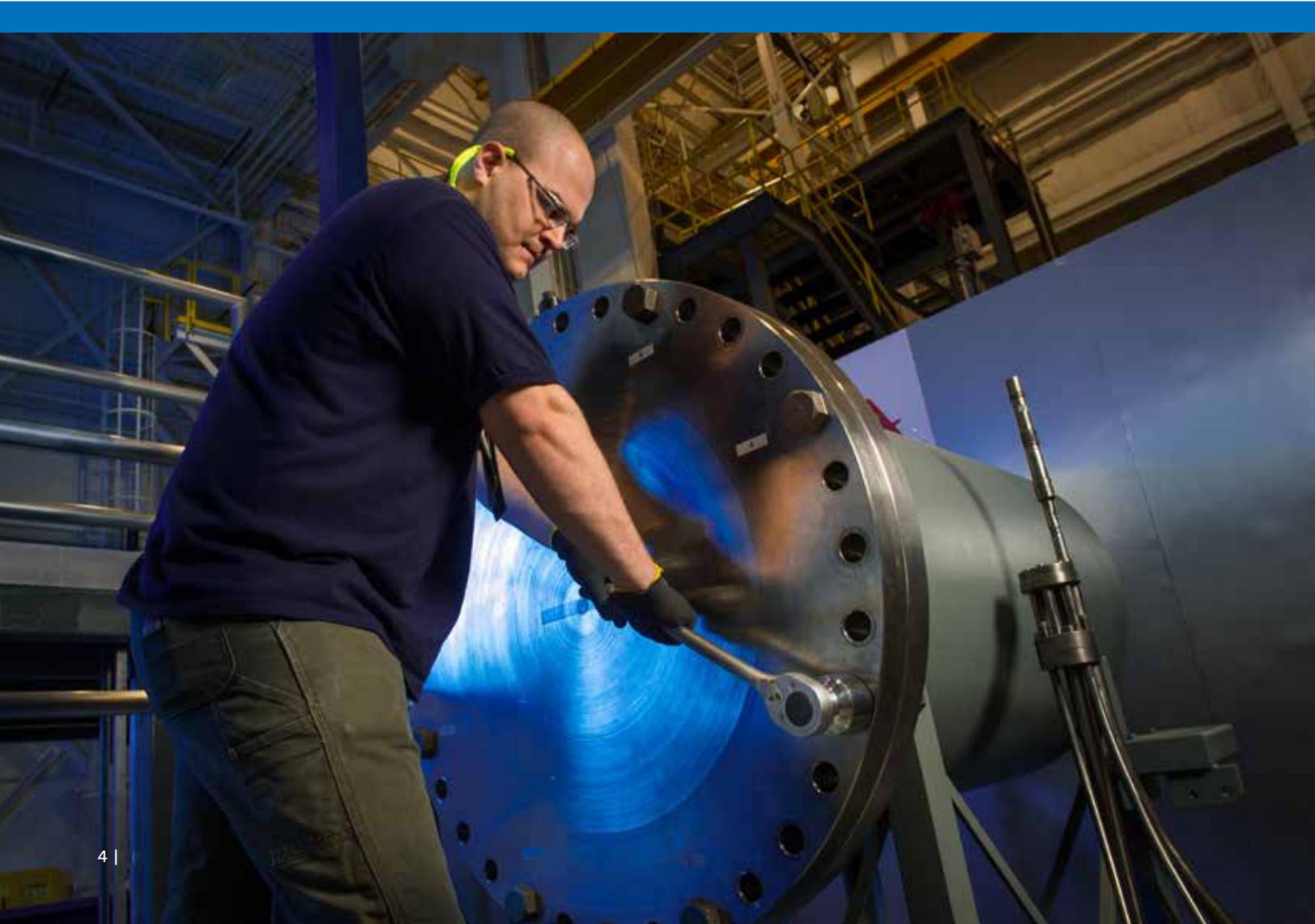
**Delivery.** Reliable, predictable and consistent.



## Performance-Driven Services

Framatome emphasizes continuous improvement in the areas of Safety and Human Performance, achieving the shortest possible optimized work schedule and fostering an empowered work force that thrives on accountability. We strive to work with your teams to apply best practices and lessons learned throughout our working relationships to guarantee continued success.

By leveraging crews trained to rigorous INPO standards from the ground up in our world-class facilities, Framatome ensures reliable and predictable power generation through operational excellence.





## PWR Reactor Services Crews

Our PWR Reactor Services crews are multi-role, cross-functional teams that can serve as on-site resources for emergent needs. Crews are trained and experienced in:

- New Fuel Receipt
- Fuel Handling
- Disassembly/Re-Assembly
- Head Area Maintenance
- Seal Table Maintenance
- Pool-to-Pad Support Services
- Procedure Creation/Revision

## Benefits

- Outage Predictability
- Reduced Cost
- Dose Savings
- Schedule Optimization
- Ensured Task Execution
- Improved INPO Ratings

## Planning and Readiness

Projects are only successful when the effort put forth during the planning and preparation phase equals or exceeds the effort dedicated to the execution. The Framatome PWR Reactor Services team lives by this motto and constantly evaluates its methods to incorporate new technology and innovative processes.

- 3D-modeling to enhance pre-job briefs
- Oversight during “routine” and “infrequently performed task evolutions” (IPTE)
- On-site dedicated engineers
- 24/7 engineering and operations support in Lynchburg, Va.
- Interactive Smart Board Technology to enhance communication between Framatome’s Lynchburg support centers and site
- Supervisors staying in role

## Tool Stewardship Program

In addition to its standard program offerings, Framatome offers a unique solution for improving tooling and equipment reliability. Through its Tool Stewardship Program, Framatome assumes responsibility for the maintenance, storage, and preparation of your site’s tools — either entirely at your site or by shipping them to our Outage Equipment Support Centers at the Framatome Solutions Complex in Lynchburg, Va. We collaborate with site personnel to complete checkouts and refurbishments, and our technicians work with your technicians — allowing you to further reduce costs and develop integrated utility and Framatome teams.





## Tools for Operability Check-Out and Refurbishment

### Westinghouse-Designed Units

- Spent Fuel Handling Tool
- Rod Cluster Control Assembly Tool
- Thimble Plug Handling Tool
- Burnable Poison Rod Assembly Handling Tool
- Irradiation Specimen Handling Tool
- Control Rod Drive Mechanism Tool
- Load Cells
- Stud Tensioners
- Head Hoists
- Tensioner Air Pumper
- Tensioner EPN Unit
- Button Height Measuring Tool
- Stud Racks
- Cavity Tooling
- Stud Hole Plugs
- Cavity Seal Ring
- CETNA Tooling Container
- Plant Tooling (Misc. Hand Tools)
- MT&E – Calibrations

### CE-Designed Units

- EPN Pumper
- Stud Tensioner
- Stud Tensioner Air Pumper
- GOTA Tool
- CEA Handling Tool
- Head Hoists
- In-core Cutter
- Stud Hole Cleaner
- Stud Hole Plugs
- Baron Stud Cleaner
- MT&E – Calibrations

### B&W-Designed Units

- APSR CRDMs
- Shim CRDMs
- Latchboxes
- Rx Head Tensioners
- In-core Cutter
- Stud Turn Out Tools
- Stud Hole Plugs
- Head Hoists
- CRDM Maintenance Tooling





## Commitment to Training

Framatome's state-of-the-art Technical Training Center is a full-scale, full-depth, wet environment fuel handling training facility. This 27,000-square-foot non-contaminated training center houses classrooms, office space, and full-scale mockups offering the latest technology to keep personnel, techniques, and designs up-to-date in the face of ever-changing regulatory and technological advances. The only U.S. facility of its kind with both PWR and BWR training capabilities in the same refueling canal, offering quality fuel-handling instruction as well as mockups for reactor vessels, multiple PWR configurations and other heavy equipment. In addition to ensuring rigorous training of our personnel, Framatome can help improve your outage performance through the further development of your personnel's technical skills. We can also provide refresher training at your site to maintain current qualifications for your team.

## Approach to Training

A full training schedule is maintained during the "off" season at the Technical Training Center — including classroom and hands-on training for new skill development, refreshment, and teamwork. One proven, successful practice is the "mock outage" format performed by each crew prior to deployment. Framatome resources combine with utility personnel, including SROs, to perform simulations of critical outage tasks. This exercise allows the team to train as a unit and exposes them to real-life elements unique to the utility's procedures and plant conditions. Mockup availability and cooperation between utilities and Framatome's training team make this extensive training possible.



### Features:

- State-of-the-art classrooms
- 27,000 ft<sup>2</sup> for training bays
- Multiple overhead cranes with up to 50 ton capabilities
- Multiple PWR mockups
- Reactor vessel closure head (RVCH) mockups
- Reactor vessel mockups
- PWR and BWR refueling bridges
- 177,000-gallon mock refueling canal
- Tower/well BWR mockup
- Component repair & replacement mockups and weld tools
- RVCH cavitation peening mockup
- NDE lab

## Framatome's Extensive PWR Mockups

- Reactor head mockup
- Upper internals
  - CRGTs
  - Bullet-nose connections
  - Thermocouple runs
- Refueling cavity
- Refuel cavity underwater training
- FME removal
- Flux thimble cut up
- Seal table
- Fuel assemblies
- Spent fuel storage racks
- Spent fuel handling tools
- BPRA tool
- CRD shaft latch/unlatch tool
- Fuel transfer system
- Stearns Roger manipulator crane
- Various models of Biach stud tensioners/turnout tooling
- Transfer tube blind flange
- GOTA tool mockup
- ICI Grayloc flanges
- Core exit thermocouple nozzle assembly (CETNA)mockup
- Segmented cavity seal ring
- RV head & vessel flanges



## Framatome's PWR Training Capabilities

- Westinghouse, B&W, Combustion Engineering (CE) reactor vessel disassembly/re-assembly
- Guide studs installation, stud hole plug installation
- Control rod drive mechanisms (CRDM) latching, unlatching, and verification
- CE-design blind flange removal/installation
- CETNA disassembly/re-assembly
- CEA extension shaft coupling/uncoupling
- ICI flange disassembly/re-assembly
- Diamond Power/Biach stud tensioner operation and refurbishment
- Cavity hatch cover removal/installation
- Segmented cavity seal ring installation
- PWR fuel handling on full-scale wet Stearns Roger bridge
  - Beginning & advanced manipulator crane operator
  - Refuel canal spotter
  - Refueling SRO familiarization
  - New fuel receipt
  - Spent fuel handling operator
  - Transfer system operator
- Fuel handling tools:
  - New fuel handling tool
  - Spent fuel handling tool
  - BPRA tool
  - RCCA change tool
  - CRDM unlatching tool
  - Thimble plug tool



## Continuous Innovation

As a dynamic and responsive organization, Framatome continuously strives to learn more and challenge the status quo in our drive towards operational excellence. A key component of our approach includes industry-leading innovations we've successfully brought to the field. Our team members are on the ground at your sites — and we're listening. We hear your challenges, and we're innovating to develop solutions that not only solve your specific challenge, but also have applicability to others in the nuclear industry.



### Engineering Support

- Tool design
  - Refuel and bridge support
  - SG engineering
  - Controls systems
- Process and equipment design
  - Head lift and 3D modeling
  - Procedure creation/revision
- Field troubleshooting support (24/7)
- Innovation website management

### High-Speed Internals Lift Rig

Electro-polished surface for reduced contamination build-up, FME, and improved weld NDE

- Full stainless steel construction
- Integrated personnel access platform remains dry
- Permanent ladder
- Replaceable engagement studs
- Floating torque tubes for better alignment
- Integrated seismic restraint brackets

### Reactor Vessel Stud Hole Plugs

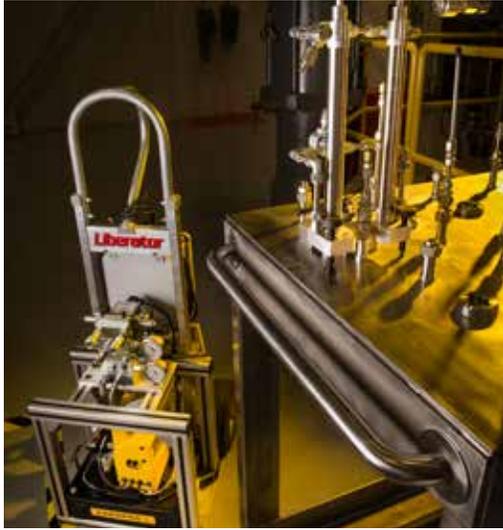
Quick and easy install/removal to limit dose

- Light alloy plug equipped with a gasket which is normally expanded by a spring
- Simple tools allow spring compression or release for installation/removal operation
- Short or long tool for operation with or without the reactor vessel head in place

### Seal Table Maintenance Innovations

Designed to improve efficiency at site saving time and dose

- Thimble tube hydraulic jacking tool
  - Universal hardware kit allows for sharing between sites with different seal table configurations — opportunity for fleet cost savings
  - Lightweight hardware, control console easily moved in containment
- Thimble tube puller/cutter
  - Removal and replacement of flux thimbles
  - Reduces risk of shattering thimbles and leaving fragments in the reactor vessel or cavity



### Core FOSAR Vacuum

- New underwater vacuuming system that can be used to retrieve foreign material underwater
- Replaces below-the-core-plate FOSAR vacuum (“SNUFFI”)

### CET Repair & Replacement

Framatome now offers a safe solution by removing your old thermocouples with vibrations

- Less pulling tension for safer thermocouple removal
- Simple, easy-to-use tool with control at all levels
- No damage to conduits
- Reduced operator exposure — less dose
- High success rate — fewer repairs to upper internals
- Less risk of contamination and irradiation for operators
- Generates no waste and requires no chemical substances

## Experience, Innovation and a Commitment to Success

At Framatome, the advancement of commercial nuclear power is our heritage and our life blood, and we are proud to be considered a performance partner focused on operational excellence. With a commitment to your success — now and for future outages, Framatome’s PWR Reactor Services team can help you secure operational excellence with:

- Safe, predictable outage performance
- Continued innovation to improve quality and predictability and reduce costs
- Comprehensive PWR services — from refueling to repairs
- Proven PWR experience and proficiency
- A responsive, innovative and dynamic culture geared toward operational excellence

Framatome, previously known as New NP (former subsidiary of AREVA NP), is a major international player in the nuclear energy market focused on designing, building, maintaining and advancing the global nuclear fleet. In North America, Framatome Inc. combines U.S. and Canadian leadership to deliver innovative solutions and value-added technologies to support the operation of the commercial nuclear fleet and prepare for the next generation of nuclear power plants. Leveraging the expertise of its 2,300 North American employees, Framatome Inc. is helping its customers improve the safety and performance of their nuclear plants and achieve their economic and societal goals.

Join the energy conversation with Framatome Inc. on Twitter: @FramatomeUS and Facebook: @FramatomeUS.

Framatome is owned by the EDF Group (75.5%), Mitsubishi Heavy Industries (MHI – 19.5%) and Assystem (5%).

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