

I&C for refueling machines, cranes and lifting devices

Modernization of Control Systems

Framatome's solutions for the modernization and optimization of refueling machine, crane and lifting device control systems improves safety and reliability, and enhances operational performance.

Challenge

In nuclear plants, operational and maintenance activities require diverse lifting and rigging equipment, of all sizes and capacities, from the smallest to the largest one called a polar crane with lifting capacity of tens of tons. Some of these devices are designed for specific works like fuel loading or reactor cavity activities.

The refueling machine of a nuclear power plant is a mobile lifting device that plays a critical role during nuclear plant outages. Loading, unloading and shuffling of fuel assemblies takes a considerable amount of time, accuracy and effort.

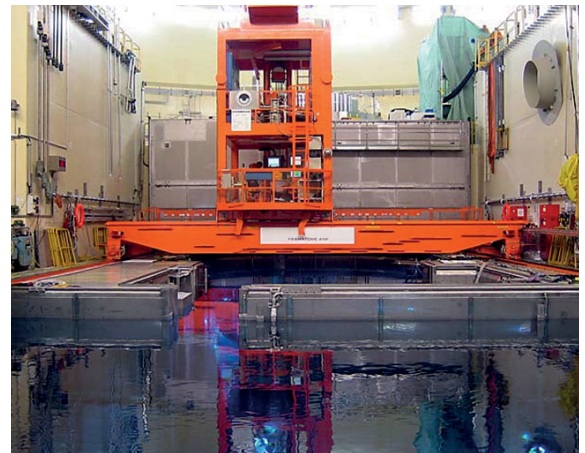
Due to aging of I&C components and obsolescence of older I&C equipment, operators face a potential increase of malfunctions along with reduced reliability, resulting in increased costs for maintenance and delays during outages.

In addition, the maintenance of old I&C systems becomes more difficult due to outdated technology and fewer experienced resources. Plant owners are also responsible for meeting new licensing and regulatory requirements/standards regarding issues like seismic tolerance, safety and cybersecurity, and expected schedule improvement for core loading.

Solution

Framatome engineered safety classified handling and lifting equipment solutions include I&C that is adapted to all requirements and needs. Customers get the latest Programmable Logic Controller technology that includes features to increase safety while optimizing outage performance. Crane and lifting device solutions are customized to the needs of each customer, ranging from manually operated systems to fully automated operations.

Once installed, customers see improved processes during their outages that result in increased safety while saving time, cost and dose.



Refueling Machine

Customer benefits

- Reduction of core loading and outage time, up to two days
- Optimized safety and reliability according to the latest IEC and DIN EN standards
- Improved supply of spare parts, and availability of service and maintenance staff
- Reduced maintenance and downtime
- Project certainty due to use of proven methods and qualified software
- Minimized risk working with a global team of engineering experts with worldwide experience successfully installing and operating modernized refueling machines

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

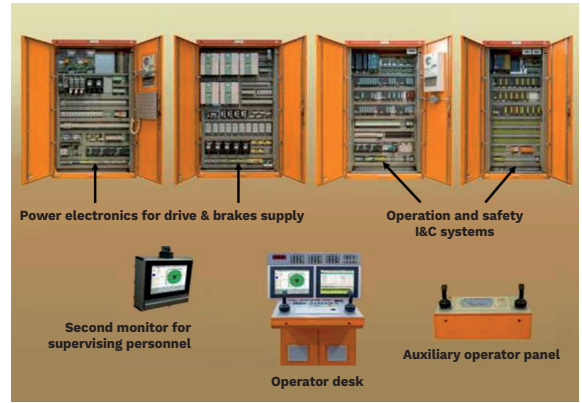
Technical information

Framatome's scope of refueling machines or cranes and lifting devices solutions supplies and services includes:

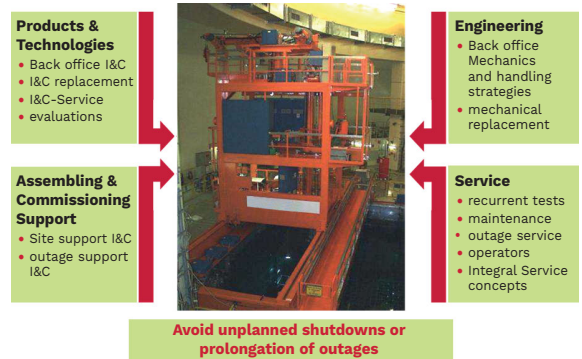
- Replacement of:
 - HMI control station
 - Operational control system
 - Safety control system
- Implementation of automated periodic test systems for all safety relevant functions
- Modernization of drive control, power amplifier, conductors, circuit breakers, and fuses

Optimization of performance by use of state-of-the-art systems including:

- Fully automated autopilot
- 3D movement
- Increase of drive speed (bridge, trolley, main-hoist)
- Optimized and predefined core loading/unloading strategy
- Replacement of mechanical parts, due to new standards or interface compatibility
- Integration of new/additional brakes
- Replacement of load cells
- Integration of new encoders



Example of refueling machine I&C cabinets



Overview of Framatome integrated scope and services

References

Reference Plants



South America

- Brazil (PWR)

Western Europe

- Germany (PWR, BWR)
- Spain (PWR)

PWR: pressurized water reactor BWR: boiling water reactor

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