

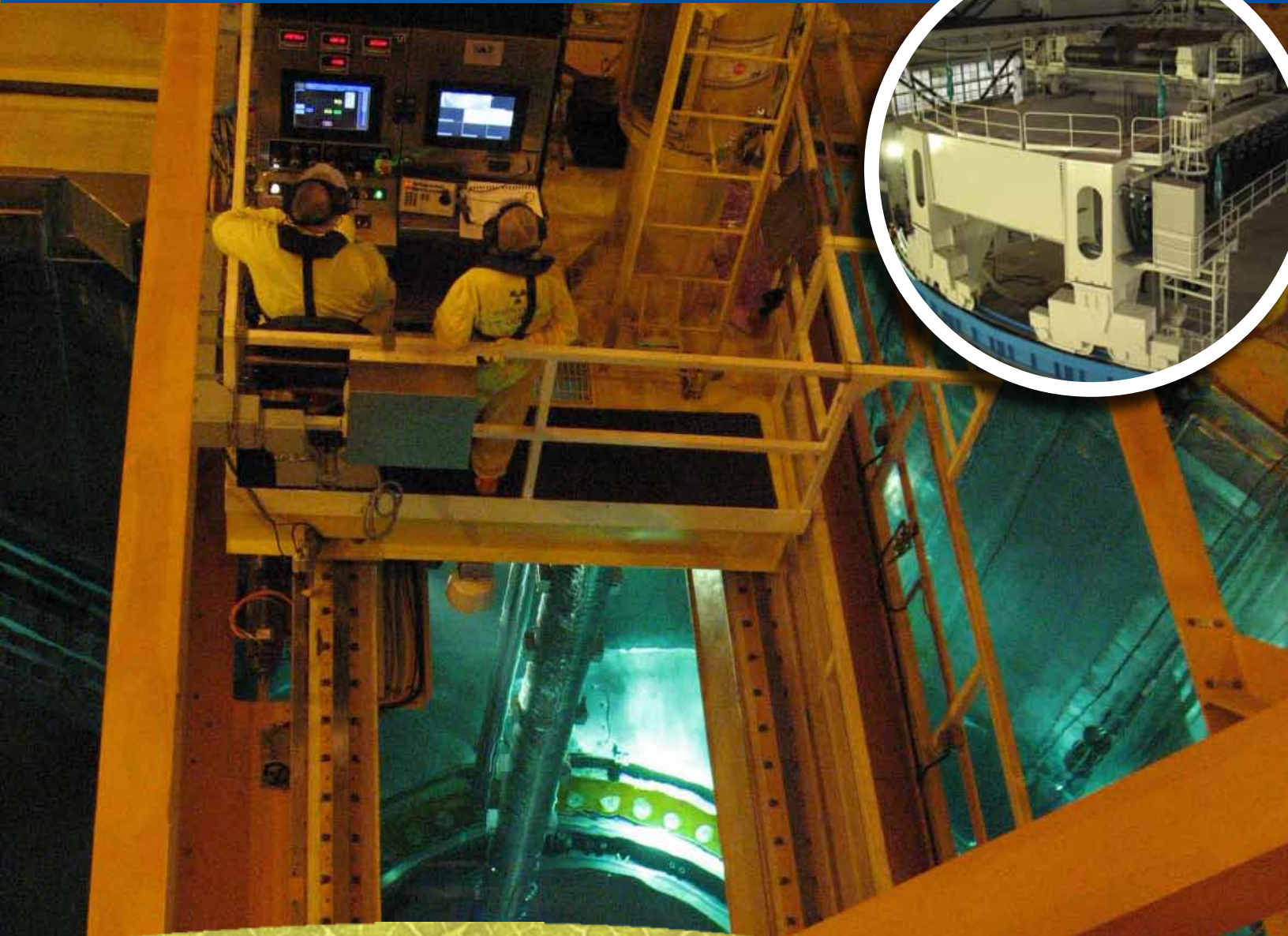
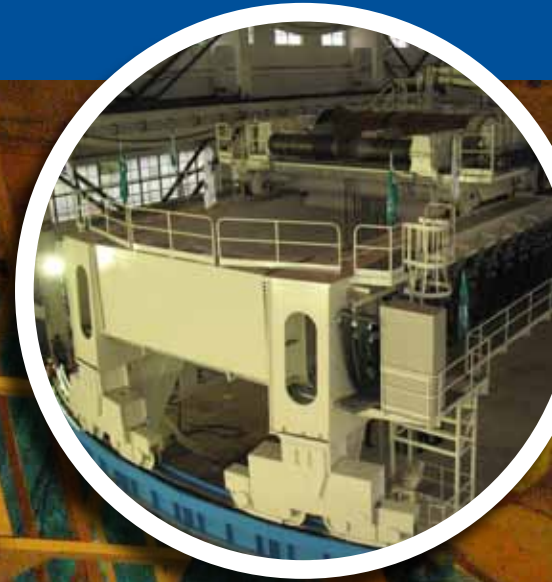
# Material Handling Solutions for the Commercial Nuclear Power Industry



Westinghouse

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if it's Westinghouse

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**PAR**  
NUCLEAR

A subsidiary of  
Westinghouse Electric Company LLC.



PaR Nuclear designs, manufactures, installs and services fueling-handling equipment and outage-critical cranes for the commercial nuclear power industry. Our primary design criteria target the safe, reliable and efficient movement of fuel and critical loads leading to shorter outages.

PaR Nuclear supplies fuel-handling equipment and cranes for nuclear power plants all over the world.

PaR's Asset Management Program identifies and reduces risks associated with obsolescence and unscheduled downtime.

PaR Nuclear's commitment to customer needs is evident in our process of continuous improvement.

- Commercially available components reducing equipment cost
- Accessibility of components improving ease of maintenance
- Design criteria minimizing dose during maintenance and repair operations

PaR Nuclear is an ISO 9001-certified company. PaR Nuclear's written quality program implementation has been audited and verified to be in compliance with the applicable requirements of 10CFR50 Appendix B, ANSI N45.2 and ASME NQA-1 by the Nuclear Procurement Issues Committee (NUPIC).



Refueling Machine (PWR)



Refueling Platform (ABWR)



Center Pivot Transfer System (CE)

### ◀ Fuel-handling Equipment

PaR Nuclear supplies fuel-handling equipment for both Boiling Water Reactors (BWR) and Pressurized Water Reactors (PWR) plants. PaR's fuel-handling equipment has been installed in a variety of Nuclear Steam Supply System (NSSS) plants including Westinghouse, Combustion Engineering, General Electric, Framatome, and ASEA (ABB Atom).

### ◀ Refueling Machines (Platforms or Manipulator Cranes)

PaR Nuclear's refueling machines are primarily used to load and off-load fuel from the reactor vessel. The machine consists of a bridge and trolley structure, hoist and auxiliary hoist. The machine is PLC-controlled with an easy-to-use operator interface.

### ◀ Transfer Systems

The transfer system transports fuel assemblies between the reactor vessel and the spent fuel pool. PaR Nuclear's standard upender design uses a hydraulic center pivot upender to transition fuel assemblies between horizontal and vertical positions. PaR Nuclear also retrofits controls for dual cable or chain driven end pivot designs.

# Human Performance - **Safety** - Quality - Production

- **Safety** – Interlocks, variable speed zones and load weighing systems support the safe movement of fuel
- **Quality** – Redundant, proven components and pre-operational checks ensure dependable equipment performance
- **Production** – PaR Nuclear’s automation software – FuelNet™ Controls – maximizes speed of fuel movement



Spent Fuel Pit Crane

## **New Fuel Elevators** ▶

The New Fuel Elevator’s primary task is to lower new fuel assemblies from the floor level of the fuel building into the spent fuel pool. Fuel assemblies are then handled by the Spent Fuel-handling Machine in the normal way.

A well-designed New Fuel Elevator:

- Has multiple redundant systems
- Is easily maintained above the water line
- Can be controlled from multiple locations



New Fuel Elevator

## ◀ **Spent Fuel-handling Machines** (Spent Fuel Pit Crane)

The Spent Fuel-handling Machine interfaces with the transfer system and new fuel elevator to move fuel assemblies within the fuel building. The spent fuel-handling machine consists of a bridge and trolley structure, hoist and often an auxiliary hoist. The machine is PLC- and computer-controlled with an ergonomic touch-screen interface.

## ▼ **Complementary Products**

- Replacement masts
- Auxiliary Refueling Platforms
- Grippers and Grapples
- Under Water Cameras



BWR Grapple



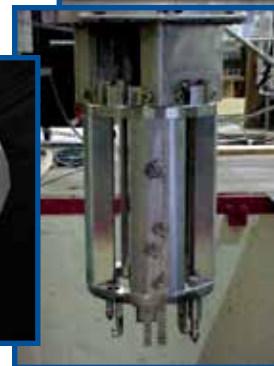
Auxiliary Refueling Platform



Fuel Master™ BWR Mast



CE Grapple



Westinghouse Gripper

## Outage-critical Cranes

PaR Nuclear provides all types and sizes of cranes for nuclear plants, with extensive experience in the major (reactor building, polar, cask handling, and turbine) outage-critical cranes. An outage-critical crane is one whose performance has the potential to impact refueling outage duration. As nuclear plants progressively reduce refueling outage schedules, crane performance increasingly affects critical-path outage time.

PaR Nuclear has extensive experience in upgrading crane performance in the aging U.S. and other reactor fleets by:

- Modernizing obsolete electrical control systems
- Increasing rated capacity and speed
- Improving reliability
- Adding fault diagnostic information, position display, programmed move sequences, zone control, load display, remote control
- Modifying to meet U.S. Nuclear Regulatory Commission (NRC) guidelines for single-failure-proof load handling



350 ton X-SAM® polar crane (700 ton construction capacity) built in 2008

### ▶ Polar and Reactor Building Cranes ▶

Reactor building cranes (known as Polar cranes when they operate on circular rails) handle reactor heads and internals and are also used to position a multitude of loads to support outage activities. In many cases they are also designed for special construction lifts. Reactor building cranes in BWRs typically handle spent fuel transfer casks and new fuel assemblies as well as reactor components.



250-Ton Polar Crane built in 1979



130 ton X-SAM® cask handling gantry crane with multi-cask lifting device integrated into load block

### ◀ Cask-handling Cranes ▶

Cask-handling cranes are used for handling a spent fuel transfer cask and in PWRs are located in the auxiliary (fuel storage) building. These cranes are designed to meet NRC guidelines for the safe movement of fuel.

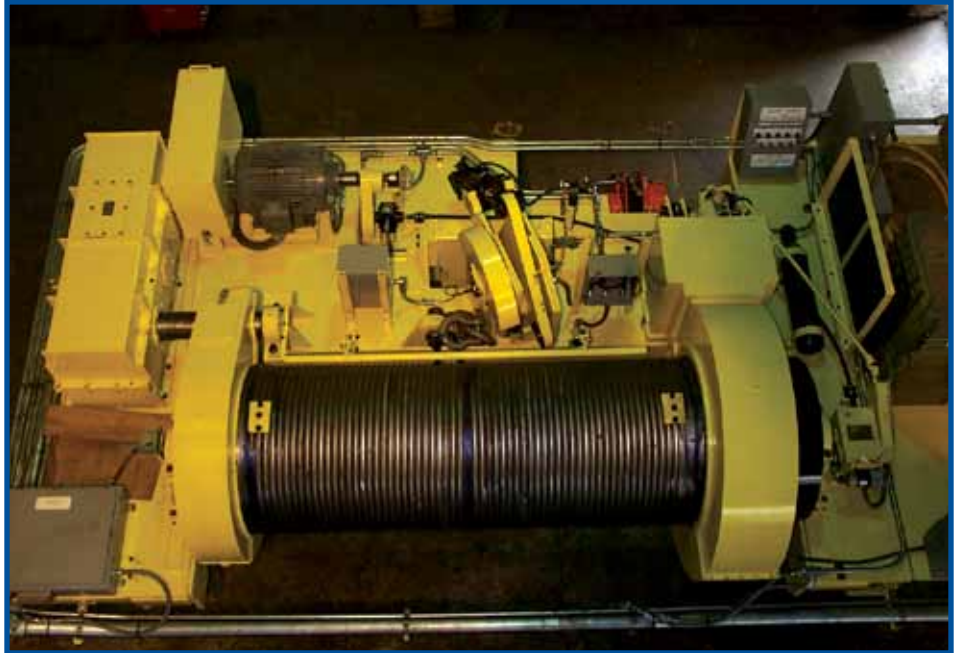
PaR Nuclear has upgraded numerous cask-handling cranes to meet the NRC single-failure-proof criteria. When needed we also re-perform seismic analysis and provide engineering, equipment upgrade and licensing support for the crane structures and supports.



110/45 ton X-SAM® cask handling crane with mechanized telescoping legs and extendable girders

## Single-failure-proof Cranes and Hoists ▼

When a heavy load handling application requires a single-failure-proof handling system PaR Nuclear provides our Extra Safety And Monitoring (X-SAM®) system. The X-SAM® design is generically accepted by the NRC and exceeds the minimum guidelines of NUREG-0554, protecting against all credible causes of dropped loads including two-blocking, load hang-up, and mis-spoiled wire rope.



125 ton X-SAM® (single-failure-proof) replacement cask crane trolley



Turbine Building Crane

## ◀ Turbine Building Cranes

Turbine building cranes in nuclear power plants are large, typically in the capacity range of 200 tons or more, often with long spans. They are frequently used to handle outage support equipment in addition to turbine and generator maintenance.

## Modernizations and Modifications ▶ for Fuel-handling Equipment and Cranes

Modernizations and modifications to existing machinery are essential to maintain and continuously improve the safety, reliability and efficiency of aging fuel-handling equipment and outage-critical cranes. With the high cost of downtime during an outage, the investment in such work often pays for itself in one or two outages. Current equipment designs address weak points in the safety of older equipment. Reliability issues are addressed by replacing components prone to failure with newer, more reliable components. Similarly, obsolete parts are replaced with more readily available parts.

Efficiency gains are a large part of modernizations. New fuel-handling equipment is designed for higher traverse speeds while modern automatic controls can safely improve the rate of fuel movement. PaR Nuclear has successfully performed many such projects over the years for our equipment and equipment supplied by other original equipment manufacturers. PaR Nuclear has the experience to manage the often unique challenges of modernizing older equipment.



Modernized Control Panel



## Contact Us



### ◀ PaR Nuclear

*(Fuel-handling Equipment, Service, Parts, Administration)*

899 Highway 96 West  
Shoreview, Minnesota 55126

Telephone: 1-651-415-4200  
Fax: 1-651-415-4500  
E-mail: [Info@westinghouse.com](mailto:Info@westinghouse.com)  
Web: [www.parnuclear.com](http://www.parnuclear.com)



### ◀ PaR/Ederer Nuclear

*(Crane Engineering)*

2700 162nd Street South West  
Building D, Suite 3C  
Lynnwood, Washington 98037

Telephone: 1-425-743-5604  
Fax: 1-425-743-5609  
Toll-Free: 1-800-240-4065  
E-mail: [Info@westinghouse.com](mailto:Info@westinghouse.com)  
Web: [www.parnuclear.com](http://www.parnuclear.com)



### ◀ NuCrane Manufacturing, LLC

*(Crane Production)*

900 Highway 7 West  
Hutchinson, Minnesota 55350

Telephone: 1-320-234-0112  
Fax: 1-320-234-0116  
E-Mail: [NuCrane@westinghouse.com](mailto:NuCrane@westinghouse.com)  
Web: [www.nucranemfg.com](http://www.nucranemfg.com)

## Asset Management

### Service Department

*(Fuel-handling Equipment and Cranes)*

[Service@westinghouse.com](mailto:Service@westinghouse.com)  
Telephone: 1-651-415-4200

Service Help Desk:  
1-612-710-1031

After Hours call:  
1-612-618-0949

### Spare Parts Department

*(Fuel-handling Equipment and Cranes)*

[SpareParts@westinghouse.com](mailto:SpareParts@westinghouse.com)  
1-651-415-4200

After hours call:  
1-612-618-0959

