

Mechanical Rod Control Cluster Assembly Change Tool

Background

Through continuing efforts to optimize the refueling services window and, consequently, the overall outage, Westinghouse offers a new and improved mechanical rod control cluster assembly (RCCA) change tool as a replacement or upgrade to the motorized model.

The motorized RCCA change tool has been used successfully in the nuclear industry for over 35 years. But with the industry-wide goal of reduced outage schedules and increased reliability requirements, it has become apparent that operation and maintenance improvements are necessary.

Description

The new mechanical RCCA change tool incorporates mechanical design features from the existing RCCA change tool, the spent fuel tool and the wet annular burnable absorber (WABA) tool.

The RCCA change tool now consists of four major assemblies:

- An enclosure that aligns the tool with the fuel assembly and guides the control rod during insert handling, similarly to the motorized RCCA change tool.
- A gripper that engages the RCCA for withdrawal or insertion and is mechanically latched on a control rod, then lifted or lowered into the enclosure using the overhead hoist. The gripper interfaces and operation have been retained from the motorized design.
- An upper support tube that includes a lift bail, actuator handle, guide surfaces and latch interfaces. This assembly controls the engagement of the gripper into the RCCA hub and how high the RCCA is retracted into the tool enclosure. The gripper is manually operated from the top of the upper support tube with the actuator handle, and is secured with a latch pin.

- A latch tube that is retained from the current WABA handling tool, which contains latch assemblies that lock the tool in the extended or collapsed position while the tool moves within the spent fuel pool. The latch mechanically interlocks the tool telescoping operation with the relative gripper position.

The improved tool uses a fuel-handling machine hoist and load monitoring, which replaces the existing motor-operated winch assembly and its associated controls. Because the new design is less complex and there are fewer components to maintain, a potential savings in critical path fuel-handling times may be realized.

Tool Operation – The starting position for the empty tool is locked in the collapsed position with the actuator handle pin locked in the disengaged position. To withdraw an RCCA into the tool, the tool is aligned and lowered onto the fuel assembly top nozzle.

The tool latches are then unlocked by the operator and the gripper is lowered into the RCCA using the hoist. The actuator handle is then pin-locked into the engaged position and the hoist is raised to lift the RCCA into the tool. The tool automatically locks in the extended position as the RCCA is fully inside the tool. The tool is then aligned and seated on the target fuel assembly top nozzle to reinsert the RCCA, after which the operation is reversed. The actuator handle is pin-locked in the disengaged position, then raised with the hoist until the tool is locked in the collapsed position, rendering it ready for another transport.



RCCA change tool gripper details

Deliverables

The mechanical RCCA change tool and related services are provided in accordance with the Westinghouse Quality Management System, which complies with ISO 9001 requirements.

Westinghouse Scope

- RCCA change tool(s) – standard delivery lead time is approximately six months
- Technical manual, including assembly drawings and operating and maintenance procedure
- Data package, including Certificate of Compliance to customer order requirements

Customer Scope

To tailor the mechanical RCCA change tool to plant-specific conditions, the following interface dimensions for the spent fuel pool are required from the utility:

- Maximum fuel-handling machine hoist hook height (with load-measuring device installed)
- Elevations of fuel-handling machine handrail, walkway and bottom of bridge (for clearance with bail of tool when stored)
- Spent fuel rack and weir gate openings
- Elevations of the top of the fuel assemblies, spent fuel racks floor of weir gate opening, spent fuel pool floor, bottom of fuel-handling machine, and pool water level

Customer scope also includes:

- Unpacking and assembly of the tool
- Tool storage bracket fabrication and installation

Westinghouse Optional Scope

Upon request, Westinghouse can provide an optional scope of:

- On-site assistance acquiring required measurements for the design
- Design and fabrication of a custom tool storage bracket
- Training services at our Waltz Mill Service Center in Madison, Pennsylvania (USA)
- On-site assembly and operation advisory services

Benefits

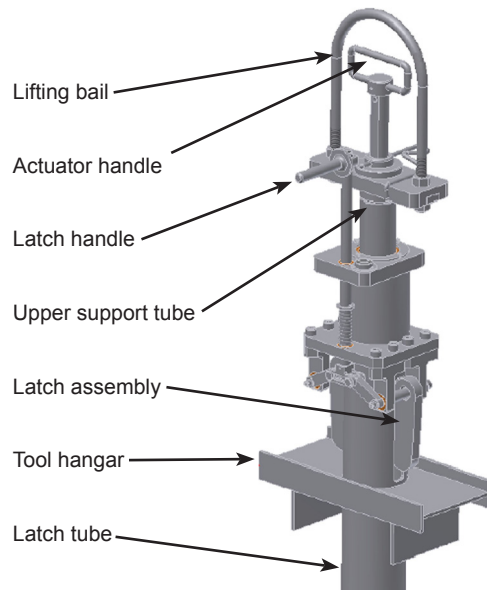
- Fail-safe mechanically operated gripper design to provide safe RCCA handling
- Mechanical operation that eliminates required electrical and pneumatic connections
- Gripper and enclosure designs that align the tool with fuel assemblies and inserts
- Reduced critical path fuel-handling times
- Reduced maintenance and spare parts
- Reduced complexity that allows for increased tool reliability

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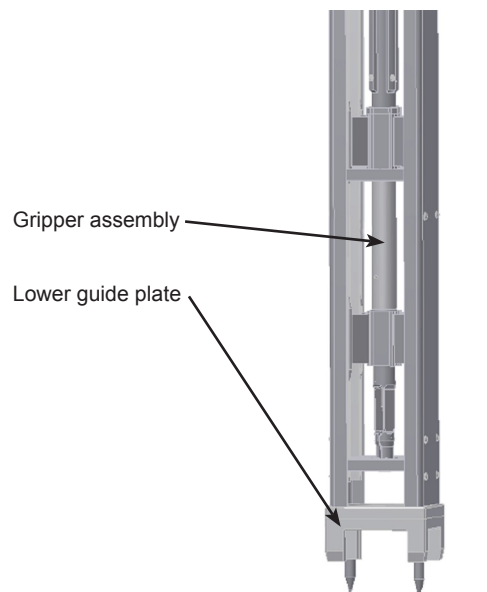
www.westinghousenuclear.com

Experience

Westinghouse has delivered over 10 mechanical RCCA change tools for use at U.S. nuclear plants and **AP1000**[®] plant sites. A training tool is available at the Westinghouse Waltz Mill Service Center in Madison, Pennsylvania (USA).



Top of the tool



Lower enclosure and gripper assemblies

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