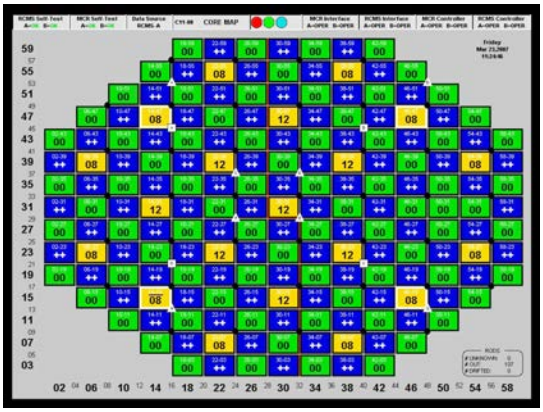
Rod Control Management System (RCMS) fact sheet

Enhanced Plant Operation and Improved System Reliability

BGE Hitachi Nuclear Energy (GEH) is the industry leader in Boiling Water Reactor (BWR) technology with over 50 years of experience in the nuclear industry. GEH offers a wide range of products and services including Instrumentation and Control systems that ensure the safe operation and maintenance of the plant, while bringing greater efficiency and output.

The NUMAC (Nuclear Measurement Analysis and Control) product line is a family of digital instruments designed to improve plant performance and increase plant longevity. GEH's newest digital system, the Rod Control Management System (RCMS) is a revolutionary, advanced digital control system designed to replace rod control and rod information systems in today's operating BWR nuclear plants. This new, integrated system combines advanced technology used in GEH's next generation of reactors, such as the ABWR and the ESBWR, with the NUMAC platform to increase plant reliability and accuracy while reducing maintenance cost and addressing equipment obsolescence concerns.

Replacing the previous rod control and information systems with GEH's RCMS in the current fleet of BWRs significantly improves plant operation and supports a main control room modernization program. RCMS has a unique design basis capability for integrated plant quality enhancement.



Large Full Core Map Display

An Integrated Upgrade Solution for Existing Rod Control and Information Systems

RCMS provides an upgraded replacement for the following systems depending on reactor type:

- Rod Position Information System (RPIS)
- Rod Action Control System (RACS)
- Rod Gang Drive System (RGDS)
- Rod Pattern Controller (RPC)
- Rod Worth Minimizer (RWM)
- Reactor Manual Control System (RMCS)
- Computer Interface Module (CIM)/Rod Interface System (RIS) with added functionality

Existing hardware is replaced with large flat-panel touch screen displays that provide rod position indication and programmable alarms. In addition, the screen offers visuals of scram valve status, diagnostics, accumulator and Control Rod Drive (CRD) system parameters and Local Power Range Monitor (LPRM) power/status.

The Rod Control Management System provides all of the following functions in one system:

- Automatic rod drift suppression preventing inadvertent rod movement
- Rod prompting/recommendations with acceptance of up to 4 pre-programmed rod sequence patterns
- Recommends rod position substitution (rods with data fault can be substituted by the operator)
- Automatic rod scram timing - During scram, acquires scram time data for all control rods
- Enhanced rod motion "timing" logic with position feedback
- Determine correct position of rods or to move rods regardless of single interface failure
- Self-test capability with alarm capabilities to signal critical faults when needed
- "Electrically" Disable/Enable CRD drives from the Rod Select Panel
- Bypass/Un-bypass Full-in Logic for Refueling Operations from Rod Select Panel

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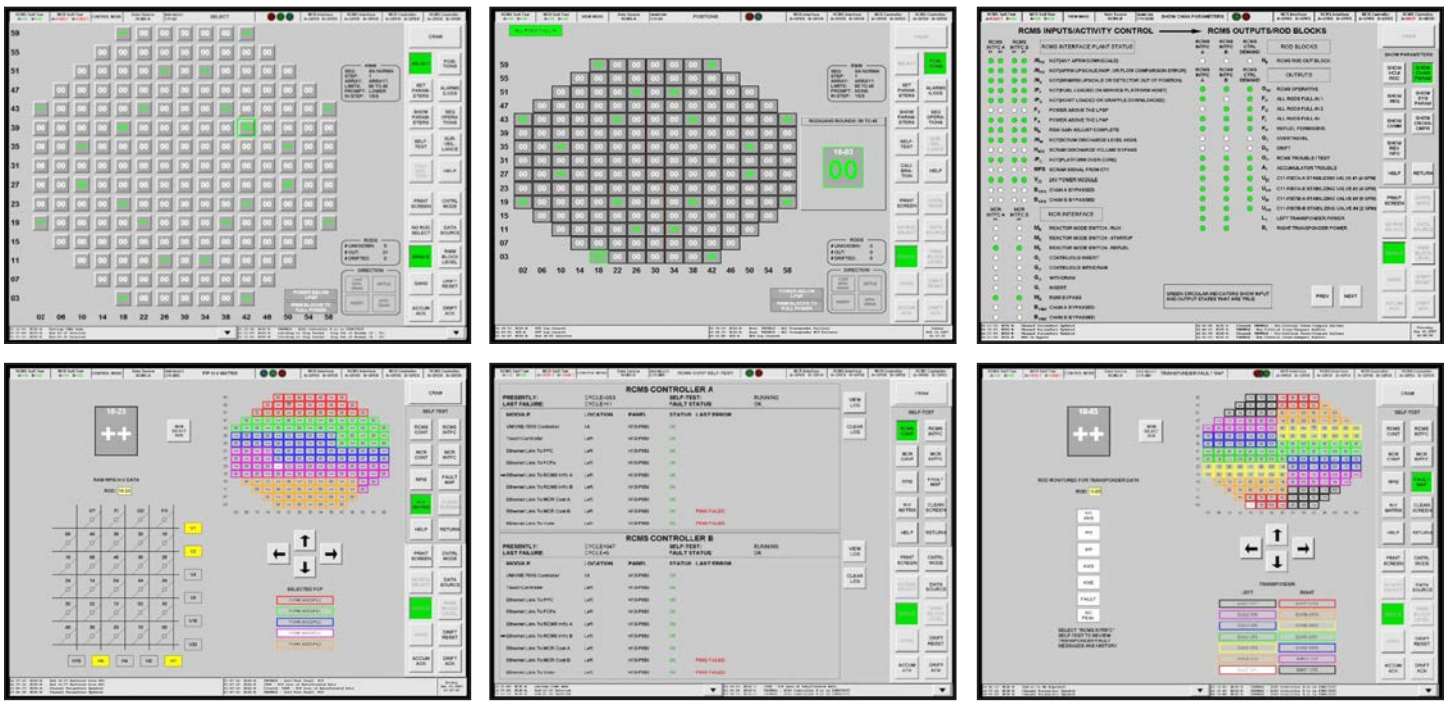
Rod Control Management System (RCMS)

Features

- Large 20-inch flat-panel touch screens, 40-inch or larger full core map display
- Environmental, EMI & seismic qualified
- Maintains automated system surveillance testing and reduces surveillance intervals
- Provides high-speed fiber optic communications that provides easy integration with other plant instruments and control systems
- Redundancy to prevent system lock-up
- Hassle-free installation – partially performed on-line and partially during an outage with minimal or no new cable pulls
- No hardware upgrades required to update software

Benefits

- Reduces start-up and shutdown time of the reactor
- Decreases testing time and maintenance labor due to automation and self-test capabilities
- Improves human factors engineering
- Improves system reliability and noise immunity
- Provides back-up position display if main control room (MCR) display should fail
- Reduced inventory costs, and increased availability of parts/cards due to commonality of system across family of NUMAC product line
- Single branch failure does not impact system operation
- Improved diagnostics over single rod control systems
- ALARA/radiation dose reduction



Rod Select, Status and Maintenance Touch Screen Displays

Easily monitor the position and state of every control rod including associated status indications, alarm states and warnings.

Note: RCMS was recognized by the Nuclear Energy Institute (NEI) in 2011 for a Top Industry Practice (TIP) Award as a new innovative digital upgrade system for information and control of reactivity at a BWR.

For more information, contact your GE Hitachi Nuclear Energy sales representative or visit us at www.ge-energy.com/nuclear

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