



Nuclear Services/Repair, Replacement and Automation Services

Main Control Room (MCR) Modernization

Background

Westinghouse has developed a modular approach to designing custom Main Control Rooms (MCRs) as part of an Instrumentation and Control (I&C) System modernization program for new plants designs. The MCR modernization program comprises the Human Systems Interface (HSI) building blocks to modernize an MCR, as well as the integration of standard, software-based HSI resources using the building-block approach. Examples of MCR configurations are based on this approach that supports new plant construction and existing plant modernizations.

Benefits

- Modular HMI approach accommodates a diverse set of potential MCR customers.
- Different licensing criteria, philosophies, and operating standards are addressed, as well as plant designs and vintages.
- The focus is on re-using HSI building blocks and only customizing software when it's necessary.
- The modular approach allows the same set of HSI equipment to be used for new construction as well as plant modernizations.

- Economic benefits are realized by minimizing the amount of HSI equipment in the MCR, standardizing the equipment used, and reducing the initial capital investment.
- Other economic benefits result from reduced longterm equipment maintenance costs over the duration of plant life.

Description

MCR Hardware Building Blocks:

- Operator control consoles
- Large display panel (LDP)
- Safety-related HSI (integrated in the operator's console or in a separate safety console)



Example of a modern, primarily soft MCR

Non-Safety-Related HSI Building Blocks:

- Distributed control system (DCS) workstations featuring two full-functional flat panel displays (FPDs), usually 20 inches diagonally across.
- An LDP driven by the DCS installed in front of all MCR operator consoles, consisting of 50- to 67-inch FPDs.
- All non-safety-related building blocks used in the MCR are Seismic Category II devices, ensuring structural integrity during seismic events.

Safety-Related HSI Building Blocks

- A Common Q FPD system, qualified to NRC

Class 1E criteria for equipment and software, utilizing channelized operators' modules for the protection system, multi-channel control, monitoring; and channelized maintenance and test for use outside the MCR

- Soft control "confirmation switches" used with soft control commands issued to safety components from the DCS or Common Q FPDs

- A safety panel, consisting of two Class 1E, multi-channel Common Q FPDs for display; safety controls with one-step access to NRC Regulatory Guide 1.97, Category 1 parameters; one set of soft control confirmation switches; and two channelized, fixed-position pushbuttons for reactor trip and the actuation of each ESF
- A "Position 4" panel, to address NUREG-0800 HCIB BTP-19, provides switches for diverse system-level engineered safety feature actuation and its accompanying display integration of HSI Resources and Building Blocks HSI building blocks are effective when integrated through software with the functional designs of HSI resources. There are four principal HSI resources: soft controls, computerized procedures system (CPS), displays, and alarms.

Experience

Westinghouse has constructed a compact control room development and test facility to enhance existing HSI resource designs and integrate the HSI resources into a primarily "soft" environment. Westinghouse has completed 9 Main Control Room Modernization Projects.