Global Instrumentation and Control

Instrumentation and Control System Modernization

Background

Aging analog systems pose various risks to nuclear power plant viability ranging from increased operating costs to reliability issues. Utilities are evaluating the benefits of an instrumentation and control (I&C) modernization program to reduce costs while improving performance. Studies have concluded that a modernization program can be justified by a cost/benefit analysis that demonstrates improved plant availability and operational margin.

Westinghouse has an extensive library of both standard and custom applications for system modernizations. Westinghouse will work with our customers to tailor these solutions to best fit the plant's specific needs within an overall integrated modernization.

Description

Westinghouse suggests the following two phases for an I&C modernization program: the study phase and the implementation phase.

The study phase includes:

- Series of interface meetings to assess operational and maintenance problems
- Plant walk-down and design data collection for involved I&C systems
- Assessment of the maintainability of each I&C system to determine how long each system can be cost-effectively maintained
- Development of system upgrade architecture for potential system upgrade candidates
- Development of upgrade schedule and implementation plan for functional upgrades; alarming; diagnostics and monitoring; and enterprise management
- Determination of impact on plant control room
- Determination of the regulatory impact on planned upgrades
- Development of cost estimates to implement modernization, including site impacts
- Performance of cost/benefit analysis, and determination of staff optimization opportunities
- Presentation of results to utility management

The implementation phase includes:

- Selection of a vendor to manage and implement the modernization program
- Optimized phased implementation over several plant outages
- Standardized hardware platform for protection and control
- Installation of the plant infrastructure during early outages, or during online operation, to reduce critical path time during an outage and facilitate implementation during subsequent outages
- Incorporation of plant subsystems by one of the following approaches:
  - Maintain existing hardware by using a standard interface to the infrastructure network
  - Replace existing safety systems with the Westinghouse proven, qualified Common Q™-based or ALS®-based systems
  - Replace existing control, monitoring and plant computer systems with Westinghouse solutions based on the Ovation® platform
  - Westinghouse standard platform equipment can use existing cabinets in situations where space is at a premium, due to the platforms' space, power, and heat load efficiency
  - Replace with third-party hardware integrating into the infrastructure network

Westinghouse

Benefits

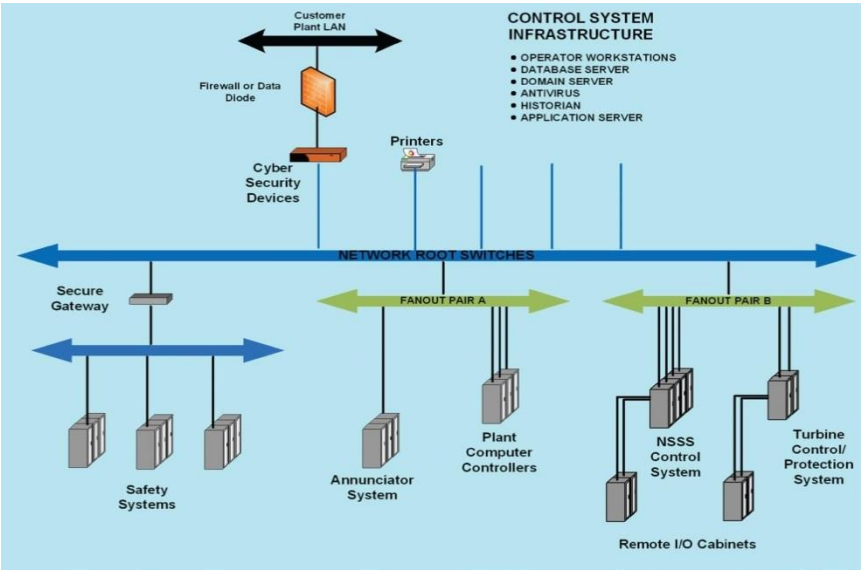
- Higher plant availability by removing single-point vulnerabilities and increasing overall system reliability.
- Accommodates the incremental addition of systems over multiple outages due to modularity and flexibility. The system grows and adapts to plant needs without adversely affecting plant operability.
- Reduction in operation and maintenance (O&M) costs due to reduced maintenance and system calibration time and lower spare parts inventory.
- Incorporation of physical and functional separation between safety and non-safety equipment and redundancy for high levels of availability to support efficient and safe plant operation.
- Distributed processing promotes savings in installation. Remote input/output (I/O) cabinets can be installed in the vicinity of the field sensors or actuation equipment.

Summary

Westinghouse's I&C System provides information at the right time and in the right form through human-engineered interfaces to maximize operator accuracy, capability and efficiency.

The new system will reduce operator errors through increased automation and better access to information, resulting in fewer trips and more rapid diagnosis and correction of problems.

- A modernized I&C system reduces operator duties through reliable controls, consolidation of control functions, automatic sequences and built-in diagnostics, all of which will allow nuclear plants to be more cost efficient.
- This modernization is capable of meeting the latest regulatory requirements. The architecture and equipment employed for the safety systems are certified to meet all licensing requirements.
- Westinghouse has extensive experience with I&C modernizations worldwide, including both PWR and BWR designs.
- Customers will realize a longer I&C system useful life by using Westinghouse standardized platforms, which have demonstrated resistance to obsolescence



I&C System Modernization Process

Westinghouse Electric Company
1000 Westinghouse Drive
Cranberry Township, PA 16066

February 2018 / NA-0016