

Global Instrumentation and Control

Ovation®-based Computer- enhanced Rod Position Indication System

Background

Westinghouse's Ovation®-based computer-enhanced rod position indication (CERPI) system provides enhanced reliability, and reduced operation and maintenance (O&M) costs. It consistently provides an accurate indication of rod position with the lowest installation cost possible.

This product design integrates more than 200 reactor years of documented lessons learned from analog rod position system (ARPI), state-of-the-art detector interface cards and Ovation controller technology.

Functions include:

- Control rod position indication
- Control rod bottom alarm
- Detector temperature compensation
- Detector linearity compensation
- Operator alarm capability
- One-pass calibration

This is the most cost-effective alternative to the complete replacement of the existing ARPI system.

Description

This system replaces the electronics portion of the ARPI system within Westinghouse plants. The system consists of a detector interface board for each rod, redundant Ovation controllers and a new computerized human-machine interface (HMI). This resolves the issues of difficult and timely calibration and inaccurate position indication for rods across the power range.

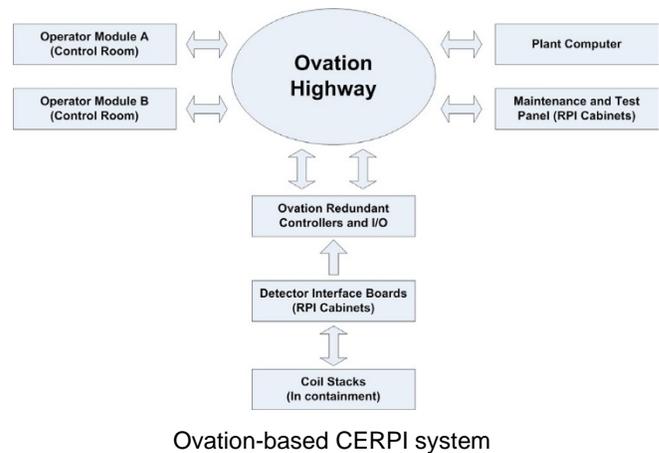
A rod drop test system is included as part of this upgrade. Plant technical specifications require rod drop time testing following a refueling outage so that the rods insert properly and within the time-response requirements of the plant's safety analysis. This system reduces critical path time by automatically analyzing the data from each rod during a reactor trip and displaying the results.



Ovation-based CERPI system main cabinet/control room cabinet

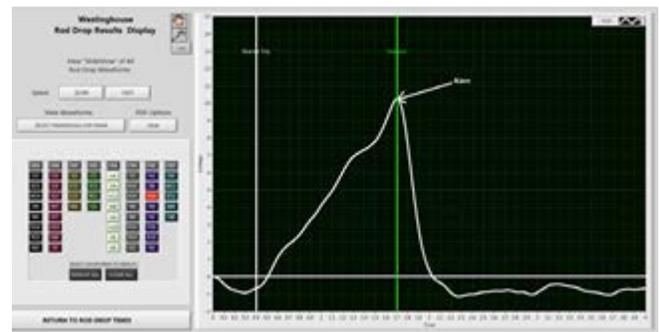
Features

- Low-cost installation
Utilizes the existing linear voltage transducer (LVTs), eliminating as-low-as-reasonably-achievable concerns and cost.
- One-pass calibration
The Ovation-based computer-enhanced rod position indication system provides simplified, computer- controlled, non-interactive, zero and span (gain) adjustments.
- Computer algorithm compensation
Detector ambient temperature and the non-linearity of the LVT sensors have been compensated for utilizing custom algorithms based on operating experience.
- Low detector crosstalk
Two different frequencies are used to drive rod LVTs, minimizing the negative effect of detector crosstalk.
- Maintenance and Test Panel
Maintenance programs provide calibration history as well as single, click-of-the-mouse, computer-controlled calibration for zero and span settings.
- Operator Modules
Operator modules are provided to enhance the operator's capabilities. The rod information is directed to control board-mounted flat panel displays and existing plant computers.
- Control rod alarms
With the greatly improved accuracy of the system's rod position indication, dependable alarming for control failures and rod bottom has been made available.
- Redundant Ovation controllers
Proven digital technology with guaranteed long- term support.
- Proven performance
This design was established by working closely with utility staff and using ARPI lessons learned for more than 200 reactor years of operation. It has been well tested and has replaced several ARPI systems. The results show that this upgrade resolves the problem at a low-installation and lifetime cost.



Benefits

- Elimination of deratings and callouts as a result of limiting condition of operation entry from ARPI- increased profit
- Minimization of rod position indication calibration in start up, resulting in reduced critical path time
- Accurate indication of rod position, resulting in increased operator confidence
- Elimination of ARPI work-arounds, serving to increase operator efficiency
- High reliability resulting in lower O&M cost
- Existing installations provide low-risk solution
- Direct replacement for ARPI and low-cost installation
- For rod drop testing, the ability to automatically perform trending analysis that compares rod drops over time



Rod Drop Test System screen

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