

Engineered Fuel-handling Equipment Upgrades

Background

Westinghouse has provided equipment to support all aspects of nuclear fuel handling since 1970.

Engineered solutions have been provided for boiling water reactor refueling bridges as well as for pressurized water reactor refueling machines, fuel transfer systems, spent fuel-handling machines, new fuel elevators, control element assembly (CEA) change platforms, CEA elevators, in-core instrumentation platforms, supervisory consoles and simulators.



Load-weighting system and cable reels

Description

The Westinghouse engineered solution provides:

- Full or partial machine replacement
- Control upgrades including FUELNET®, Westinghouse's proprietary software system that facilitates safe, automatic, semi-automatic, and manual control of fuel movement
- Camera system upgrades – above water and in-mast cameras, controllers and displays
- Cable management solutions, including cable reels, cable tracks and festoons
- Load-weighting systems and displays for fuel
- Auxiliary hoists with load-weighting and integral displays independent from the fuel-handling system
- Pneumatic system upgrades

Key electrical controls components include:

- Servo motor drives using DeviceNet™
- Programmable logic controller (PLC)
- Load cells and load cell amplifier
- Industrial computers and touch-screen monitors
- Absolute encoder positioning system using DeviceNet

Benefits

- Uses existing mechanical systems, motors and feedback devices
- Increases machine performance and reliability using a proven design
- Servo drives provide smooth operation and high torque as required to maintain commanded speed, which can compensate for poor rail conditions
- Improves component tolerance to a broader range of environmental conditions, such as radiation, temperature and humidity.
- Reduces maintenance with brushless servo motors

- Retains position memory – the absolute encoders retain their position after power disruptions. There is no need to reprogram when power is restored; even if the machine is moved without power, position information will update
- Improves traceability and security – all encoder information is logged, including changes to the user-adjustable parameters
- Provides global sourcing with off-the-shelf components

The DeviceNet network provides:

- Higher noise immunity to electrical interference than conventional encoder communications – improved system reliability and reduced downtime related to nuisance trips
- Plug and play encoders – set the digital input processing switches in the encoder to match updated drawings and reset the “zero” position on the human-machine interface (HMI)
- Cyber security compliance – provides a deterministic network with a memory function designed to respond to intrusion, tampering and other intentional or unintentional actions by alerting the utility

Key elements of the Westinghouse solution include:

- Modified applicable engineering drawings
- Motor drive and related hardware equipment kit for installation into existing equipment
- Modified applicable PLC and HMI software
- Motor drive programming software
- Encoder positioning system
- Documentation for factory testing, site testing and installation
- Cyber security evaluation and implementation achieving cyber safety



Model GR control system

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