Plant Downtime Reduced Through Better Loop Tuning and High Performance Fisher® Valves

RESULTS

- Mean time between failures in heater drains system increased from 49 to 296 days.
- Average annualized megawatt-hours lost per year due to failures has improved to nearly zero.

The Fisher® Design CV500 valve, designed for throttling or on-off applications, combines globe valve ruggedness with rotary valve efficiency..

APPLICATION
Heater Drains System

CUSTOMER
Nuclear Power Plant

CHALLENGE
This nuclear power plant was experiencing malfunctions in the heater drains system for nearly two years, resulting in an unplanned loss of significant megawatt hours of production. The heater drains system preheats the water supplied to the steam generators, increasing the efficiency of the plant, and condenses the heating steam and returns the condensate so it can be reused. The system has an indirect effect on the nuclear reactor power efficiency.

An initial review of the problem indicated that 83% of the significant malfunctions were due to level control loop components in the heater drains system. The level control loop consists of a heater tank that pre-heats feedwater to the reactor. The level of the feedwater tank is monitored by a level controller that provides a signal to a positioner mounted on a control valve. The job of the control valve is to maintain an outflow that doesn't completely empty the feedwater heater tank.

The plant initiated a major project to study and statistically analyze the heater drains system and to identify recommended solutions to the problems.

FISHER®

EMERSON™
Process Management

SOLUTION

As part of the overall solution, the plant engaged Emerson Process Management engineers to contribute their expertise in loop control. The engineers found that a key variable affecting the level controllers was instability introduced by the tuning settings. The original settings were derived by use of the Ziegler-Nichols method, which was developed in 1942 to drive controls for anti-aircraft guns. This tuning opted for speed and rapid response in exchange for some degree of stability. A more modern tuning methodology, called Lambda tuning, was recommended for the heater drain system. Other recommendations were:

- Revise the positioner calibration ranges to improve loop stability
- Install custom positioner cams to provide proper position versus signal curve
- Revise level controller settings
- Install a new level controller with anti-windup
- Replace Fisher 657-8-U and 657-A valves and actuators with newer 1052-CV500, V300, and 657-ET valves for improved performance.

RESULT

After all of the recommended changes were made to the heater drains system, mean time between failures was increased from 49 to 296 days. Also, the average annualized megawatt-hours lost per year has improved to nearly zero.

For more information on nuclear service solutions, visit www.fisher.com.

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