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Power Engineering

Control System Retrofit Cuts Maintenance Costs, Improves Responsiveness



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TWO YEARS AGO, Albany, Ore.-based system integrator Concept Systems outfitted a sawmill at the Collins Companies' facility in Chester, Calif., with new networked control systems for all the plant's machines and material handling equipment. The only control system that wasn't updated at that time was the system that operated the mill's powerhouse. The powerhouse is a cogeneration facility that provides power to operate the mill and also produces power that Collins sells back to the local power company, Pacific Gas and Electric Co. (PG&E).

To meet the requirements of Collins' contract, the powerhouse's 12 MW turbine generator must supply a certain amount of power to PG&E at certain times of the day. Meeting these needs and the electrical needs of the sawmill, plus controlling the steam supply sent to the lumber dryer and used to heat the mill in winter months, requires the pressure and water flow in the boiler to be maintained with a closed-loop control system.

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The powerhouse's old control system, installed in 1985, had become a maintenance headache and problems were hard to troubleshoot. When a malfunction occurred, plant maintenance personnel had to analyze the controller's software to identify the cause of the failure. The wiring was in bad shape; Collins' 24-volt system needed rewiring. In addition, some flow transmitters weren't working properly. Plant management faced a Catch-22: call the control system manufacturer in for service, which was expensive, or rely on its own maintenance personnel to work on a difficult system.

Furthermore, the existing system required significant operator intervention for proper operation and some of the processes had to be run in manual mode constantly. Collins wanted a system that could operate reliably and efficiently in automatic mode.

Besides wanting a more reliable and robust control system and better maintenance information, Collins also wanted to update the powerhouse control system to be compatible

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with the Allen-Bradley controls that were previously installed in the main mill.

Concept Systems replaced the old digital control system (DCS) with an Allen-Bradley ControlLogix system with redundant power supplies and redundant processors, and added a new operator interface based on Rockwell's RSVIEW32 package. The new system has room for growth: It can serve three operator stations and process up to 5,000 tags (I/O control points and set point values). The initial implementation uses approximately 2,500 tags.

Parameters controlled by the new control system include the rate at which the wood chips are fed into the boiler, the dryer temperature, and the water flow into the boiler. The new control system also monitors turbine-generator temperature and vibration, and the boiler pressure, helping ensure that no water gets into the turbine.

To aid the plant's maintenance and operations personnel, Concept Systems added alarms (close to 700 new alarm points) and improved the operator interface (more graphics and help displays). Now, if a conveyor goes down, plant maintenance personnel can see the problem. If an indicator fails or a plug is tripped, the operator has the information and can tell the electrician what part failed. The new operator interface also provides additional dimensions of operator control; the operator interface supports electronic control of some components that were previously adjusted manually using valves and knobs.

Control panel wiring is an area where Concept Systems' attention to detail is paying off for Collins. With the old system, wiring problems caused a lot of downtime. Plant maintenance personnel were afraid to open the control cabinets because of unreliable wiring. In addition, connections were brittle and water would short out the system.



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The powerhouse's 12 MW turbine generator must supply a certain amount of power to Pacific Gas and Electric Co. at certain times of the day.

Concept Systems prewired the new cabinets at its Albany headquarters and prewired the cabinet connections to the devices in the field to minimize downtime during the switchover from the old control system to the new one. Because of the advance preparation, Concept Systems installation engineers began checking out devices on the third day after installation began. The entire installation was completed within one week.

The new system has improved response time, the boiler now responds more quickly to the need for increased power generation, and power generation uptime has also been improved. If the power ever went out in the old system, the old computer would need to be completely reloaded. Now, if either PG&E's power, the plant's power, or both go down, the operator station will stay up long enough to ensure an orderly shutdown of the boiler system if required.

Collins has been very happy with the results. Work is continuing on the dryer and other areas of the power generation system to make the system even more efficient in converting the raw wood chips into power.

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