

Scenario[®] Simulation Contributes to Dairyland's Error-free Startup at the Madgett Station

RESULTS

- Trained operators in efficient use of the new control system resulting in an error-free plant startup
- Provided the ability to demonstrate critical operating skills, thus reducing exemptions for "operators in training" by 80%
- Permitted performance testing for further plant operational improvements
- Improved operators' skill, experience, and confidence in accurately responding to normal and abnormal plant operations



APPLICATION

Simulation of a 405-megawatt, coal-fired unit with a Riley Stoker turbo-fired subcritical boiler and a Westinghouse double-flow reheat turbine generator

CUSTOMER

Dairyland Power Cooperative (Dairyland) J. P. Madgett Generating Station, located in Alma, Wisconsin

CHALLENGE

In 2004, Dairyland Power Cooperative replaced their thirty-year-old plant control system with state-of-the-art Ovation[®] expert technology from Emerson Process Management.

Modernizing a system that is critical to efficient plant operation presented several challenges. The first challenge was to determine an effective method of verifying that the new controls operated as specified. System installation is typically performed during a set outage period with no room for lengthy delay. New controls need to be as accurate as possible in order to meet important deadlines for timely plant startup. The second challenge was training the plant staff in the operation and maintenance of the new equipment to ensure a smooth technology transition without interruption to service or performance. Finally, Dairyland required on-going education of existing employees and qualification of new employees for safe and efficient operation of the Madgett station.

"Training our operators on Scenario was a major contributor to having no operator errors during the plant's startup with the new control system. We now use our simulation solution year-round to efficiently train new operators, improve the skills of experienced staff, and test plant changes before going live."

Terry Briggs
Shift Leader, Operations
Dairyland Power Cooperative
J.P. Madgett Station



SOLUTION

Emerson's Scenario® simulation, customized for Dairyland's needs, provided the right solution. The Madgett Station Scenario solution is a hardware replica of the plant's Ovation control system, including 12 controllers, four operator workstations, and one engineer workstation. Scenario preserves the direct use of the Madgett control configuration and graphic files, as well as all of the engineering functions, so an operator can transition from training to plant operation without hesitation. During startup, the plant did not experience any operator errors due to the extensive hands-on training provided by the Scenario simulation.

Scenario was designed with a customized mathematical model of the Madgett station that provided a first-principle duplication of the plant using process components based on thermodynamic laws and energy conservation principles. The plant was modeled and parameterized to create a realistic indication of plant parameters during steady-state operation and periods of dynamic response to equipment operation, control actions, and malfunctions.

Scenario satisfied the first project goal by verifying proper operation of the Ovation control system prior to installation, thus saving valuable time during the plant outage. The simulation solution is also used to evaluate future changes in control, process, or equipment dynamics and to execute performance testing for additional plant operational improvements.

Dairyland's Scenario simulation meet the other challenges by being used year-round to:

- Systematically train plant operators in the safe and efficient operation of the Madgett station.
- Develop operator skill, experience, and confidence in accurately responding to normal and abnormal plant operations.
- Satisfy long-term training objectives in a host of areas such as general plant theory, knowledge of plant systems, operating procedures, and malfunction recovery.
- Reduce qualification times of new plant operators. In the past the qualification process was lengthy due to the fact that the trainees had to wait for the plant to be available to perform required duties. Now, potential operators can easily demonstrate plant operation with Scenario without waiting for the plant to shut down.

“Our plant operators say Scenario is the best training tool ever provided to them. The decision by management to invest in this technology is viewed by the operators as a long-term investment in them. It provides a training program custom designed to maintain and improve their skills which ultimately provides better and more efficient plant operation.”

Terry Briggs
Shift Leader, Operations
Dairyland Power Cooperative
J.P. Madgett Station
Dairyland Power Cooperative



The Scenario solution for Dairyland's J.P. Madgett station mimics the control room layout to provide realistic training conditions for the plant operators.

