

# Emerson's Ovation™ Control and Simulation Technologies Helps Reduce Time, Expense Associated with Commissioning First U.S. Ultra-supercritical Power Plant

## RESULTS

- Contributed to achieving Commercial Operation Date (COD) within 4 months after first fire, several months faster than is typical for a new coal plant
- Significantly streamlined training on new technology, where more than half of the operations department had no previous power-industry experience
- Reduced cost of control system validation and testing by more than \$100,000



## APPLICATION

A greenfield 600-megawatt coal-fired steam station equipped with an ultra-supercritical Babcock & Wilcox boiler, Babcock & Wilcox air quality control systems, and an Alstom steam turbine generator.

## CUSTOMER

Southwestern Electric Power Company (SWEPCO), an operating unit of American Electric Power (AEP), John W. Turk Jr. (Turk) Power Plant located in Fulton, Arkansas, USA.

## CHALLENGE

SWEPCO's base-load Turk plant was built to provide reliable and affordable power to support the growing needs of their customers. Additionally, the plant provides significant benefits for the local economy by employing up to 2,200 people during construction and operating with 109 permanent positions.

The Turk plant's state-of-the-art equipment allows for more efficient electricity production at higher temperatures, requires less coal, and produces fewer emissions to generate the same amount of power as existing coal units. As the first ultra-supercritical generating unit in the U.S., it was crucial for the plant to be in commercial operation before the end of 2012. Key factors to meeting the commercialization date were a validated, accurate control system and a well-trained operations staff.

### SOLUTION

The John W. Turk Jr. Power Plant in Fulton, Arkansas, went into commercial operation Dec. 20, 2012, just four months after its first fire – several months faster than is typical for a new coal plant. Advanced control and simulation technologies from Emerson were key factors contributing to this significant achievement. The technologies also enabled SWEPCO to reduce the cost of control system validation and testing by more than \$100,000 and to significantly streamline operator training on controls for the new ultra-supercritical plant.

The Turk plant uses ultra-supercritical advanced clean coal equipment that allows operation at elevated steam temperatures and pressures and features state-of-the-art emissions control. Use of both technologies makes it possible to boost the efficiency of coal-based electricity generation by more than 50 percent while maintaining superior environmental performance. Emerson has significant experience automating large ultra-supercritical and supercritical power generating facilities, having been selected to automate more than 60 percent of such units in China.

Emerson worked closely with the SWEPCO team to develop the sophisticated logic needed to integrate the controls for the ultra-supercritical boiler into the overall plant automation architecture. Emerson's Ovation™ system controls and monitors the B&W ultra-supercritical boiler; burner management system; air quality control system, including flue gas desulphurization and selective catalytic reduction systems; and balance-of-plant processes. The Ovation system also interfaces to various third-party subsystems, including the Alstom steam turbine generator controls.

SWEPCO engineers used the Ovation high-fidelity simulator to extensively test, validate and finely tune the new system's coordinated control strategies before actual plant startup. By providing a simulator in a secure, virtual environment, Emerson enabled numerous AEP engineers from across the U.S. to participate remotely in the comprehensive logic and integration testing, slashing testing time from 8-10 weeks to only three weeks, and saving more than \$100,000 in travel and living costs. Extensive remote testing also enabled SWEPCO to minimize the need for control changes after startup.

Operator training also presented a particular challenge for SWEPCO. While some of the new plant's staff came from other AEP/SWEPCO sites, more than half of the 33-person operations department were new hires with no previous power-industry experience. The Ovation simulator was instrumental in training the entire operations staff on the use of the controls, as well as plant procedures used during normal operations and abnormal conditions. Operators were able to become familiar with the controls prior to startup, learning the interactions between plant systems through a highly realistic simulated environment, thereby reducing the likelihood of human error once the plant was fully operational.

Emerson provided 25 redundant Ovation controllers, 16 workstations, one historian and AMS Suite predictive maintenance software, which streamlines device configuration and commissioning for more efficient plant startup. The Turk plant also utilizes digital bus-based technologies, incorporating 48 FOUNDATION™ fieldbus segments and 88 DeviceNet™ segments to network intelligent field instrumentation. In all, Ovation manages approximately 5,600 hard I/O points and 9,250 soft I/O points.