

Arizona Public Service Four Corners Plant Increases Power Generation Efficiency

by Wonderware

“The Plant Intelligence solution implemented at the Arizona Public Service-four Corners plant resulted in a significantly more efficient power plant.”



Company Overview

Arizona Public Service – Phoenix, Arizona (USA)
Serving the West for more than a century, Pinnacle West and its businesses, including Arizona Public Service, have earned a reputation for customer satisfaction, shareholder value, operational excellence and business integrity. Through our subsidiaries we generate, sell and deliver electricity and energy-related products and services in the western United States. We also develop residential, commercial and industrial real estate properties.

Four Corners, NM – Arizona Public Service (APS), a division of Pinnacle West, is a major electricity supplier in Arizona and bordering states. APS runs a coal-fired power plant in New Mexico called Four Corners, located where the states of Colorado, Arizona, New Mexico and Utah all meet at one geographical point.

The Four Corners plant generates 2,040 megawatts of power, making it one of the largest coal-fired power plants in the U.S., capable of powering 300,000 homes with electricity. The plant uses ten million tons of coal each year, and all of it is mined from a nearby Navajo-owned mine. To increase the power-generation efficiency of its Four Corners facility, APS decided to install software from Wonderware.

The plant includes five units and more than 28,000 I/O points, three fourths of which are analog points controlled with Bailey and Honeywell DCS systems. The monitored points include nitrous oxide emissions, boiler temperatures and equipment settings. Prior to Wonderware’s involvement, APS was already storing historical data with an older system, but the software tools limited how the data could be used and only a select number of people could access that data. The old trend charts – primarily paper charts that monitored trends at various points – also provided limited information that did not enable employees to make proactive adjustments that would improve real-time process or equipment performance and overall plant efficiency.

A Modular Approach

The fact that Invensys’ plant intelligence solutions are designed to be modular, easily deployable and centrally maintained was also a key consideration when APS elected to install the new system.

In addition, the Wonderware plant intelligence solution could help APS increase boiler efficiency by utilizing a neural network developed by NeuCo, a neural network supplier for the power industry. This installation required a real-time plant data historian to feed the neural network.

APS installed one Wonderware Historian (formerly known as IndustrialSQL Server or InSQL), real-time plant historian and an I/O server from Standard Automation and Controls for the Bailey and Honeywell interface. A node from Wonderware’s

InTouch HMI (Human Machine Interface) software monitors the health of the power plant and provides information to the neural network.

The Wonderware Historian was attached to the corporate network to allow mechanical engineers, supervisors, maintenance and operations staff, and environmental engineers to review data utilizing ActiveFactory software reporting and analysis clients. Forty-nine ActiveFactory software licenses, the Wonderware Historian and the telephone and pager capabilities of Wonderware's SCADAalarm event-notification software have been deployed.

The new Wonderware plant information system has now been running nonstop for more than a year. All of the data collected has been stored locally, where users can quickly recall it when needed. APS reported the following benefits from the introduction of the Wonderware Historian and ActiveFactory software:

- In order to use the old plant information system in real time, engineers used to spend hours in the control room monitoring the live data. Today, with the Wonderware tools, engineers can monitor live data from their desks, and they can recall the data from previous minutes, hours, days, weeks or months to more efficiently optimize key plant processes;
- APS also uses the data to troubleshoot or determine the reasons for "trips" (downtime events). Four-to-five trips a year are normal. Reducing that frequency could save millions of dollars of lost revenue. Data from the Wonderware Historian is also used in daily production reports generated by the ActiveFactory software, saving plant employees time and effort, and providing accurate reports for better decision-making;

- Engineers regularly use the data to determine if an engineering project could increase efficiencies. The result is a more efficient and productive power plant, keeping costs low and APS competitive in its industry.

The Neural Network

The NeuCo Network uses historical data from the Wonderware Historian to make process adjustments that optimize plant efficiency and minimize emissions. The result is a power plant that produces more power for the same amount of coal consumption while keeping the nitrous oxide emissions to a minimum.

The Wonderware Historian is the source for the historical data and the NeuCo network processes this data and sends optimized set-point data to the InTouch HMI. The InTouch HMI software feeds the I/O server the information and the DCS system's set points are adjusted.

APS' Four Corners plant has successfully integrated the Wonderware Historian and NeuCo Neural Network. Results show that the neural network is increasing plant efficiency and that the troubleshooting capability of the ActiveFactory Trend feature is helping the staff to avoid downtimes and increase efficiency.

The plant intelligence solution implemented at Arizona Public Service's Four Corners, New Mexico, plant resulted in a significantly more efficient power plant.

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