

# American Express Retrofits Existing Metasys BAS with Adaptive Control Technology

Optimizing a chiller plant doesn't necessarily mean implementing an entirely new Building Automation System. American Express in Greensboro, NC, discovered they could enhance the operation of their chilled water plant without changing out a single wire of their existing Johnson Controls Metasys system. Instead, they retrofitted the existing control system with a new TekWorx adaptive control system which allows the chiller plant to minimize kW usage.

The project began as an upgrade to an existing cooling tower at American Express, which not only had single speed fans, but degraded efficiency due to fouling and debris. The consulting engineering firm of Sutton-Kennerly & Associates (SKA) was called on to assist with the project. Upon investigation of the cooling tower and the chiller plant, the engineering team suggested American Express consider using TekWorx to control the entire chiller plant.

The engineering team and the TekWorx representative, James M. Pleasants Co., reasoned that this control approach would take them beyond what they could achieve with the typical BAS in terms of long term efficiency versus an equipment upgrade alone. In fact, Johnson Controls and other leading BAS companies have turned to TekWorx to provide optimization—the difference being that TekWorx actually monitors kW consumption of the equipment and controls accordingly. For example, while a BAS system can operate a set of pumps and chillers based on a preset schedule, TekWorx technology sequences them to minimize kW consumption under any given set of circumstances.

TekWorx adaptive capability takes efficiency to the next level by analyzing the actual conditions during sequence operations and adjusting sequence points automatically and continuously for full optimization.

## The Payback

Preliminary estimates on how *much* adaptive control could save American Express were compelling. Based on a thorough load profile of the building and the performance of the existing equipment, TekWorx estimated they could save American Express 400,000 kW per year, resulting in an approximate savings of more than \$20,000.00 in a single year. It was enough for SKA to advocate putting the entire chiller plant on TekWorx control. However, operating engineers, Joe Vigorito and Bob Miller were hesitant to unhook the chiller plant from the existing Metasys system since rewiring would be so labor intensive. In addition, the existing system was not in need of replacement—it functioned perfectly—but could not provide the optimization that American Express wanted and needed. So the question was posed: Could TekWorx adaptive technology be implemented *within* the existing control framework?

The answer was **YES**.



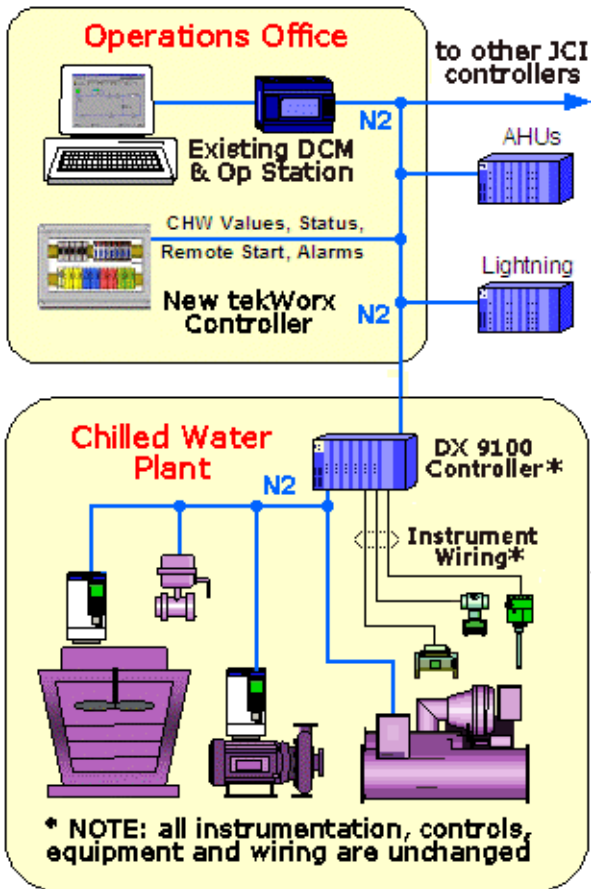
## PROJECT SNAPSHOT

**Facility:** American Express, Greensboro NC  
**Size:** 450,000 square feet

**Situation:** Poor overall efficiency due to single speed cooling towers. Existing Johnson Controls Metasys system provided all plant operation control according to preset parameters but did not incorporate any adjustment based on kW monitoring.

**Solution:** Implement TekWorx adaptive technology *within* the existing control framework.

Figure 1



## Enhanced Logic Without Rewiring

Fortunately, TekWorx's N2 communication driver made it easy for the controller to exchange all the necessary signals and operational data with the existing Metasys system which was directly wired to the system components. The Metasys system collects analog and digital points from the plant equipment and instrumentation and passes this data to the TekWorx controller. After processing this information in the adaptive control algorithms, the TekWorx unit passes the appropriate course of actions back through the BAS.

Making this interface happen was a fairly straight forward matter of gathering some operational and equipment data. First, Johnson Controls had to provide all the operating values for the following equipment: condenser water pumps, chilled water pumps, cooling towers, chillers, primary pumps, and a plate & frame heat exchanger used for outdoor air economizing.

Using this information, TekWorx built and programmed a controller that connected directly to the Johnson Controls system, but without any common wire from the components themselves. (See Figure 1)

Once the notebook sized control panel was built and programmed for optimization, TekWorx system engineer, Larry Tillack installed the control, a relatively simple matter of connecting one cable to the Johnson Controls network. Johnson Controls provided the on-site programming of their own equipment to facilitate communications.

## A Painless Transition

"It was really a smooth process," remarked Bob Miller, speaking of the overall implementation of the TekWorx control with the Johnson Controls interface. Miller, and boss, Joe Vigorito are both Operating Engineers for Trammel Crow Company, the on-site property management firm that manages American Express Operations. Both gentlemen were involved in the upgrade from the beginning. Miller added that the system, which first went on line in April 2004, has only required minor tweaking since the final stage of implementation in September. Miller also confirmed that the entire chilled water plant is operating more efficiently than ever before.

In addition to the rewiring that American Express avoided, there is another benefit to this type of retrofit. The existing Johnson Controls system can and will act as a "fall back" system should the TekWorx controller ever fail. Although Johnson Controls cannot provide any kW analysis or adaptive control, it can bypass the TekWorx control and operate the entire chilled water plant if needed, providing automatic on-off control of equipment.

The very fact that adaptive control can coexist with an existing system opens new doors to facilities who would like to upgrade their system without replacing an entire BAS. TekWorx is capable of accommodating other network protocols.

"It's not electronic communication that makes or breaks a retrofit like this," said Mike Flaherty, TekWorx's president. "It's interpersonal communication—teamwork between all the involved parties—that determines the success. In the case of American Express, everybody communicated, and everybody benefited."

## What They Had to Say....

"It was really a smooth process."

*Bob Miller*

*Operating Engineer, Trammel Crow Company*

"Retrofitting an existing BMS with adaptive control in many cases optimizes the utility savings potential. We currently have plans to further enhance the chilled water system at American Express by evaluating and implementing a variable primary chilled water loop."

*Gary Smith, PE*

*Sutton -Kennerly & Associates*