Nanjing Metro

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"(The Wonderware solution) has significantly increased efficiency, reduced our error rate, made it easy for us to add functions and has allow us to maintenance the system at a much lower cost. It will definitely help us as we continually expand."

Niu weixing
Project Engineer

Wonderware Solution Helps Nanjing Metro Move Forward

Goals
- Construct and operate a safe and efficient metro system for the city of Nanjing
- Provide a comfortable travel experience while reducing energy consumption

Challenges
- Nanjing is a large city with only one other metro line
- The new solution must manage 24 stations as well as a control center, repair depot and other supporting facilities

Solutions and Products
- Wonderware System Platform
- Wonderware InTouch® HMI
- Wonderware Historian
- Wonderware ActiveFactory®

Results
- The Wonderware solution forms the foundation for the new train line which serves over five million citizens of Nanjing
- Development and implementation of the line has been efficient and the scalability of the Wonderware software will ensure that planned expansion will be efficient

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Nanjing, China – The first underground rail line opened in London in 1890. Since then, cities the world over have built metro systems to help their residents and visitors travel for work and leisure. According to the International Association of Public Transport (UITP), metro networks carried 155 million passengers per day in 2006.

Nanjing, China is the second-largest city in the country and has a population of more than five million people. As such, its leaders recognize the economic and social importance of a modern light rail system. The Nanjing Metro is comprised of three major lines, and recently the development and expansion of Metro Line 2 has been a focus.

Mapping the Metro

Metro Line 2 was planned to connect the eastern and western suburbs of Nanjing across the Changjiang River. Civic leaders knew that providing a comfortable means of travel along this 25-kilometer route would be a benefit to their citizens.

Managing the new line would be critical. It needed to be efficient and reliable, with additional goals of saving energy and providing a high level of safety.

To meet this comprehensive list of objectives, the city worked with Nanjing NARI Group Corporation (now NARI Technology Development Company, Ltd.), a company with expertise in Supervisory Control and Data Acquisition (SCADA) and Building Automation Systems (BAS) for rail transportation automation.

Complying with the Code

The government of China requires that railways adhere to the specifications of the "Code for Design of Metro," which mandates decentralized control with centralized management. Because the Wonderware System Platform is proven to provide exactly that, NARI chose it as the basis of the new line.

For example, the Nanjing Metro Facilities Management System (FMS) uses a decentralized architecture to control equipment at the stations such as air conditioning, ventilation, water supplies, drainage, escalators and lighting. The central command room (OCC) manages security for the entire Nanjing Metro Line 2, while it monitors and controls the 24 stations, a repair depot and parking facilities that comprise the system. Programming and editing of timetables is also handled centrally.

The signal system is integrated with the FMS so that information about tunnel and line conditions is communicated and incorporated into train schedules. This is especially important if obstructions or other abnormal events happen, and ensures the safety of commuters.

Redundancy is also built into the OCC to maintain reliable communications as part of the safety system of the line. Two backup monitoring servers with communications interfaces are connected to the central command room, plus an additional two monitoring servers are on standby.
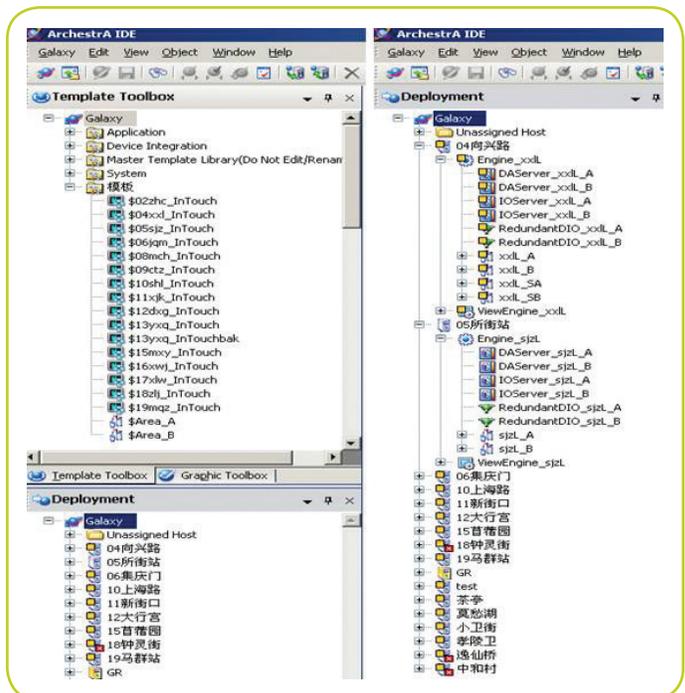
Expanding Efficiently

Another helpful aspect of the solution is the Wonderware InTouch® HMI (Human Machine Interface). Its object-oriented architecture enables the OCC and all 19 stations to share uniform code and screen views. Since the system uses common equipment throughout all locations, objects and codes can be templated and are reusable, making changes and additions easy and rapidly executed. Given that five more stations are planned for the line, the scalability and standardization offered by the Wonderware solution will be increasingly important for this system.
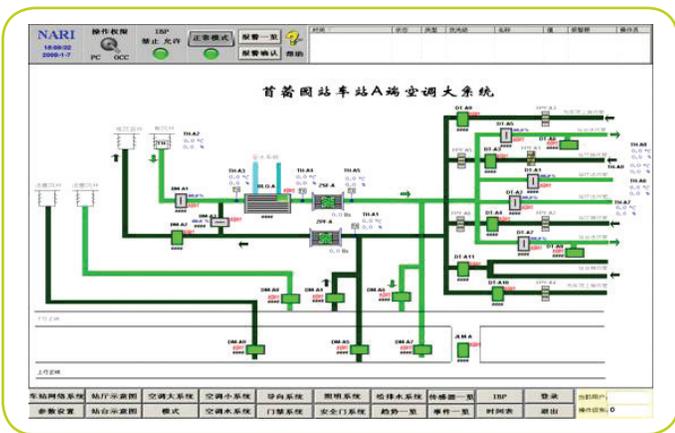
"Wonderware provides a unique architecture that allows our developers to complete applications as quickly as possible. The graphic templates standardize the way operators look at screens. This helps reduce errors and make work more efficient," said Niu weixing, Project Engineer.

The new solution's ease of use is appreciated by operators and engineers because it saves time and makes training less complicated. Managers also appreciate that maintenance can be more proactive. Whether scheduled or on an as-needed basis, repairs are made quickly.

According to Niu weixing, "Changes are propagated across the different objects in the application, making it faster to do re-work and maintenance."

Saving Energy and Money

Sustainability and saving energy through efficient operations have been key factors in the success of the line. The solution gives managers great visibility so they can make the best possible operational decisions. With Wonderware Historian gathering data from every station and device in real-time, system status information is always available. Staffing and facilities management decisions can be made nearly instantly to save money as well as power.

The solution generates reports through the Wonderware ActiveFactory™ software. Using this information, supervisors can see trends that assist them in making forward-looking decisions. They are also able to communicate system data amongst themselves and share it with operators more easily.

On Track for Growth

China has recently been at the forefront of a renaissance in railway systems. As a growing metropolis, the city of Nanjing is likely to continue to be a leader in metro transportation. Serving future needs is another reason why the Wonderware solution and its superior scalability and management capabilities have been a good fit for Nanjing Metro Line 2. As it expands and additional lines are added, Wonderware will grow with it and provide a smooth ride.