Rotterdam Electrische Tram

Integrated automation system ensures smooth running of city's train stations.

Central Station, the newest addition to Rotterdam's metro network.

Sitting on the banks of the Nieuwe Maas river, Rotterdam is the second largest city in the Netherlands and home to Europe's busiest port. The municipality covers an area of 319 square kilometres, of which 206 sq. km are on land. It is part of a greater metropolitan area with a total population of approximately 1.6 million.

Since its creation in 1878, Rotterdam's public transport system, known as RET, has come a long way. From its early days of horse-drawn and steam trams, it now moves more than 600,000 passengers a day, or 185.7 million people a year, around the city on its 34 bus lines, eight tram lines, two metro lines and its Erasmus RandstadRail-line. It has a fleet of 238 buses, 118 trams, 152 metro trains and a newly established high-speed ferry service.

The Challenge

Since the 1980s, parts of RET's network of 60 metro stations were controlled by an outdated switchboard system. It managed some of the stations' escalators and elevators but its capacity could not accommodate the natural expansion of the metro system nor the increasing complexity of the various functional elements involved.

In 2000, RET began to look for a solution that would offer them greater control and scalability, as well as the highest level of reliability. They needed an infrastructure monitoring and control system that could integrate the many critical elements at work in the metro stations, including escalators, elevators, public address systems, closed-circuit TV (Pelco), ticket vending machines, lighting, emergency intercoms, pumps etc. After some research, they concluded that the solution that would best suit their requirements would be a SCADA system with open communication protocols, enabling them to continue using their existing equipment while enhancing its performance and effectively managing maintenance costs. CitectSCADA's free development license offered them the opportunity to develop and experience working with a leading SCADA system before making the bigger commitment to purchase it and modernise their operations. They also wanted to ensure that any new monitoring and control system would be flexible enough to accommodate future growth and expansion.

The Solution

Performance and openness were key factors in RET's decision to implement a CitectSCADA solution. They also preferred CitectSCADA as it came as a complete package, including all necessary drivers etc., with nothing else to buy separately. Working with a team of system integrators, it configured automation processes consisting of 75,000 tags, 50,000 alarms, five I/O servers, two alarm servers and 20 clients. The network

The Challenge

To update from an old switchboard system to a monitoring and control solution that could accomodate all the stations' various functions - elevators, escalators, public address systems etc. RET also required a solution that would accomodate the metro system's natural expansion and increasing complexity.

The Solution

Its open communication protocols and scalability made CitectSCADA the natural choice for the new control system. RET implemented a system consisting of 75,000 tags, 50,000 alarms, five I/O servers, two alarm servers and 20 clients, all connected on an Ethernet backbone.

It subsequently integrated a CitectHistorian solution to enable them to better analyse alarms and assess and address downtime issues.

The Benefits

Their CitectSCADA / CitectHistorian solution has helped RET increase staff efficiency and cut operating costs. It can now remotely monitor all its stations, thereby reducing the need for staff to travel around the city. They can also manage more stations without having to increase staff numbers. The historian solution helps them optimise their maintenance schedule and costs by effectively measuring equipment usage.

CitectSCADA   CitectHistorian   Case Study
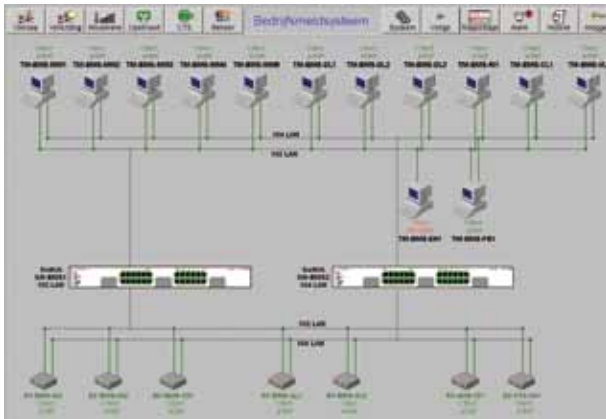
Overview of the network.
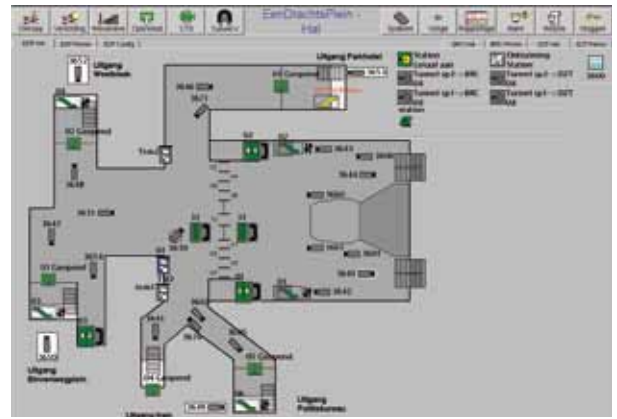
SCADA view of the escalators and elevators in a station hall.

is connected via an Ethernet backbone and configured in isolation, ensuring additional security for the stations' critical services.

Pelco close-circuit TV cameras were partially integrated into the SCADA system to further enhance the safety and security of passengers and personnel. Through this interface, operators are able to project the CCTV images onto the video wall so that when an alarm is raised in the SCADA system, the corresponding image comes up on the wall. This significantly cuts down on valuable response time in case of an emergency as previously they had to bring up the images manually.

In 2008, RET found that they would benefit from a reporting tool that could help them visualise and manage alarms and identify problem areas and equipment. To that end, they integrated a CitectHistorian solution with CitectSCADA. This allows them to view and analyse all alarm totals over specific time periods in order to assess and address downtime issues in the metro system such as escalator breakdowns. This visibility facilitates the diagnosis of equipment failure, helping them to rectify problems faster and prevent them from recurring in the future. Moreover, the alarm rationalisation reports generated by CitectHistorian help them evaluate operator responses when an event occurs, thereby enhancing their effectiveness.

Statistics at a Glance

Real-time SCADA variables:	60,000
Advanced Alarms:	300-400/day
Historical Trends:	1,000
SCADA Display Clients:	20
SCADA I/O Servers:	5
SCADA Alarm/Report Servers:	2
CitectHistorian Server:	1
I/O Devices:	80 (Omron)
Average response time as measured at SCADA:	½ second
Number of CCTV cameras (Pelco):	1200

The Benefits

With the CitectSCADA and CitectHistorian solution in place, RET can now remotely monitor its 60 stations from just one central control room. Staff no longer have to travel around the city to manually open and close stations, increasing their productivity and efficiency.

Normally, six people would be required to staff a station during the course of a full day. Yet, when RET opened a new metro line and added eight new stations to the grid, they found that they could operate the stations without the need for any additional personnel. That amounted to a substantial payroll savings!

Despite having systems that varied slightly (ie 200 escalators of different models and vendors), RET was able to configure them all into one CitectSCADA solution quickly and cost-effectively. As a result, they achieved a system that cohesively monitors and controls numerous, diverse applications. CitectSCADA's built-in redundancy also provides valuable system reliability, minimising any downtime that would impact on customer service and safety. With its CitectHistorian solution, they are now able to effectively measure equipment usage so as to optimise their maintenance schedule and costs. Instead of conducting standard maintenance of equipment at the same intervals across the board (ie every three months), RET can now independently measure usage of elevators etc. to increase or decrease maintenance as warranted by the level of use. This flexibility reduces their operating costs and ensures that the money is spent where it is actually needed.

"The CitectSCADA/CitectHistorian solution's open and highly scalable environment allowed us to configure the system quickly. And, by having everything in a single database, we are able to save time and money on system maintenance," says Peter Kuijf, Senior Technical Specialist at RET. "From this database, we are able to configure all the necessary functions (ie alarms, devices, categories, labels, graphic pages and genies), as well as all the SQL tables for the historian," he continued.

RET is currently in the process of upgrading its version of CitectSCADA to benefit from additional features and functionality. In the near future, they plan on opening another new subway line with 10 more stations. There are also plans to add an electronic ticketing system, which would also be incorporated into the SCADA system. Thanks to CitectSCADA's scalability and openness, they are confident that their solution will be able to cater for all this growth.

For more on automation solutions visit www.citect.com