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Application Focus - A "Smart" Secure Facility

A great application fit for SoftPLC controllers and Web Studio products is in controls and monitoring for secured facilities, such as prisons and juvenile detention centers.

SoftPLC distributor ***HD Campbell*** in Seattle, WA is supplying Smart SoftPLC's, Tealware I/O, and Web Studio SCADA and HMI's to a local system integrator. The integrator, who specializes in these type applications, is doing the controls portion of a $5M mental hospital expansion project for the state of Oregon. The project is being implemented in 3 phases - Phase I began in early 2010, and Phase II will begin in 1st quarter 2011. The controls portion of the project is over $1.7M for the PLC, intercom and personal alarm systems. Another integrator is handling the CCTV portion of the project, but an interesting tidbit is that the facility has over 1000 cameras!

In this expansion project, there are (12) Smart SoftPLC CPU's with local Tealware I/O, all connected via ethernet. (48) 12" HMI's *(so far)* will be mounted in the hallways and at the nurse's stations. To reduce cost, the HMI's are using the Secure Viewer Thin Client feature of Web Studio, connected to a 64K tag runtime at the main monitoring station.

SoftPLC products were selected for this project due to flexibility of our solutions, as well as cost savings over proprietary PLC solutions - particularly with regard to the networked nature of this installation *(eg: the Smart SoftPLC has a built-in managed ethernet switch)*.

This integrator had never used Allen-Bradley PLC's, so a web-based training session was held with SoftPLC Corp. personnel to familiarize the programmer with the Smart SoftPLC including TOPDOC, hardware/software configuration, and the ladder logic addressing and instruction set. The integrator had another smaller project early in 2010 for which they also used the SoftPLC products, which was a nice way for them to "get their feet wet" when gearing up for this larger job.

HD Campbell has provided terrific local support and account servicing throughout the bidding process and the project implementation.

Electronic Controls and Automation Has a Lock on New Detention System Technology

Web Studio Technology Enables Security for Tarrant County Facility

Background

While most people agree that prisons are necessary, most people also believe that prison inmates should be treated humanely. What's not been considered until recently is how technology can assist in the mission of most detention centers: to safely secure individuals having been sentenced by the state to a prison term.

And that's the philosophy of Captain Pilkington, a detention center veteran of 18 years, and the senior officer in charge of Green Bay Detention Center in Tarrant County, Texas. "These men are in our custody and it's our duty to not only ensure they serve their sentence, but that they serve it in a safe environment."

So when it was time to upgrade the facility, he was glad to know that the county agreed to bring new technology to bear in pursuit of that goal.

The Challenge

About 10 years ago Tarrant County officials realized they did not have enough prison space. They responded by purchasing large numbers of warehouses and converting them to county detention centers. Green Bay is just one of many such facilities.

Green Bay is a 1,500 bed facility, and every square foot must be monitored, and—when necessary—locked down. Additionally, communication systems must be in place so that officers can report any problems, because anything from fire to riots is possible in such large facilities.

The original detention centers were equipped with un-integrated systems that separately enabled intercom communications and closed circuit TV cameras. The systems were individually controlled by traditional hard panel boards that used outdated pushbutton and relay technology.

According to Green Bay facilities manager Ken Forge "Unfortunately, to Tarrant County, relays and pushbuttons represented tried and true technology—and indeed they've been around virtually forever. However, they can be a maintenance nightmare, because they're mechanical and are really best deployed only as mechanical switches that are controlled by solid state computing devices."

Then there is the problem of managing the facility with multiple systems. Monitoring a 1,500-bed security facility requires a significant amount of attention from the staff. The situation is fluid and it can change in an instant. One minute everything can seem orderly and under control, and with very little warning things can get out of control very quickly.

What's needed in such an environment is the ability to establish centralized control, which is exactly what most detention centers strive to do. In the case of the Tarrant County facilities however, the problem was that the technology in place simply fostered an inefficient use of manpower. The staff really couldn't do the job efficiently.

Fortunately, a local systems integration firm, Electronic Controls and Automation (ECA), had a solution. ECA was uniquely qualified, bringing to bear two best-in-class technologies: Omron PLC hardware and SoftPLC HMI/SCADA software.

The Solution

There is a seamless integration between the hardware that monitors and controls the security systems and the HMI/SCADA software that the staff uses to operate them. ECA developed a prototypical solution that could be templatized and extended to any detention center. They began with a very simple concept that evolved into a very sophisticated, extensible solution. They decided to tie the closed circuit TV system into the intercom system as an intuitive, ergonomically sound solution that enabled officers in the existing command center to work more efficiently and more cohesively as a team.

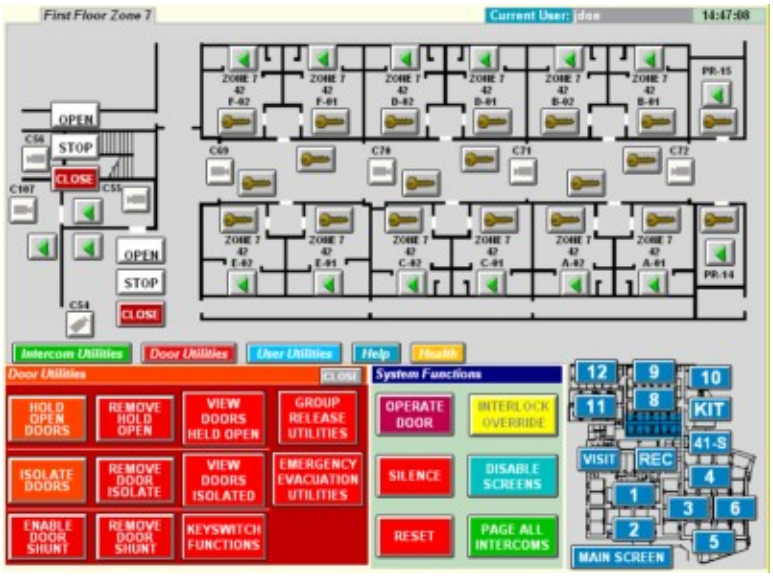
They also took the opportunity to create a two-station configuration that was both independent and redundant. A separate data-logger provides both standard and report generation of all system activities, which was not possible with other software ECA used prior to Web Studio.

The SoftPLC Web Thin Client technology also enables management and control officers to use a typical browser, such as Internet Explorer, to view data in real-time, independently from multiple workstations. This unique architecture means that operators or managers at two different stations can simultaneously monitor an area or an operation. They can also interact individually or jointly with the system controls as needed.

The result in the case of the Green Bay facility is that the command center officers can always know exactly what is happening in every part of the facility at any time. As doors are opened or shut and locked or unlocked both officers can be apprised of any given situation, but both can operate independently of the other.

The other advantage is that the interface is extremely intuitive. The system is broken down into zones that correspond to collections of security posts. Every zone has several designated posts with multiple closed circuit TV cameras that enable operators to view every officer in that zone. Each officer's post is also equipped with an intercom that enables communication between the post and the command center.

The command center interface systematically scans every camera, displaying a view of both officers and inmates at each post in each zone throughout the facility. A corresponding visual representation is simultaneously displayed below the camera view that highlights the post for that camera. Intercoms for the scan zone are also represented and can be activated with a simple mouse click so that command center officers can communicate with security officers or inmates.



Officers also have the option of overriding the scan to view any zone at anytime, enabling them to monitor and communicate with officers throughout the facility. Those officers, in turn, can override the scan by activating their intercom when they need to communicate with the command center.

Finally, ECA also tied the door locks into the system, which enabled door control protocol enforcement. The system programmatically ensures that doors are locked and unlocked in the right order, and that doors that should not be unlocked at the same time would remain locked or unlocked in accordance with the defined protocol. They even built in a secondary safety measure that forces the officer to confirm that he wants to unlock the door.

In the event of an emergency, all locks controlled by the system can be systematically unlocked or locked, again with two simple mouse clicks.

Results

The Green Bay facility reports several significant benefits from the ECA deployment. The biggest benefit according to Captain Pilkington is every law enforcement officer's biggest concern: the need for backup.

"Unless you work in a detention center, you can't really begin to understand the level of comfort that you have knowing that no matter where you are in the facility someone is always watching your back. That capability is fundamental to any law enforcement operation, and before the ECA system was in place, that capability didn't really exist because it was just too complicated."

In addition to the obvious day-to-day benefits other unforeseen benefits also materialized. According to Ken Forge, the system is also an amazing troubleshooting tool.

"We were very concerned a few months after the system was deployed because we kept having random lock failures in one area, which were quite puzzling. The locks would simply not engage occasionally, and nobody could understand why. At one point we decided to check the records and realized that all the failing locks were the result of normal foundation shifting. The shift caused an internal misalignment with the locks, and had nothing to do with the software or the system electronics."

Once the locks were realigned, they worked perfectly from that point forward. Forge continued: "Not only was the software not the problem as we feared, it actually helped us to identify the real problem, which would have been extremely difficult to determine otherwise."

The benefit to the staff was also nontrivial in bringing it online. The intuitive nature of the interface enabled the command center officers to come up to speed in about one day, as apposed to weeks for similar systems—a critical selling point for other detention centers. Also, the command center for the entire 1,500-bed facility can be manned by two officers—a stunning tribute to the efficiency of the system.

As far as ECA is concerned, the Green Bay solution was a terrific launch point for a series of successful deployments. They currently have 22 deployed systems all based on the same basic application template they developed for the Green Bay facility. They now spec out and sell similar systems to other system integrators without ever setting foot on site.

The system is also so extensible they can add capabilities onsite. According to ECA engineer Louis Davis III, "When a client asks for additional functions and features, we can go onsite and make the upgrade on the spot with little to no downtime. All we have to do is to make the requested change at one of the independent stations in development mode and load the new runtime. The system is incredibly extensible; the result has really outpaced our expectation."