

## In Lincoln's museum, artifacts rely on fine-tuned controls

Looking back, those who attended the 2005 grand opening of the spectacular Abraham Lincoln Presidential Library and Museum in Springfield, IL now must realize they were witnessing history. The two featured speakers that day were President George W. Bush, and a relatively unknown Illinois Senator named Barack Obama.

Ever since, the Lincoln Library and Museum has been making history, quickly becoming the best attended of all the presidential libraries and one of the most talked-about new museums in the world. And no wonder. The 200,000-sq-ft complex is fully 50% larger than any other presidential library and the 50,000-sq-ft museum alone occupies an entire city block in downtown Springfield. Visitors expecting the sterile marble halls and quiet tones of the stereotypical museum visit instead get an exhilarating ride through a series of life-like displays, holographic ghosts, special effects theaters with booming cannons and rumbling seats, and a host of interactive presentations. It's considered to be the world's first major 'experience museum.' Not surprisingly, the budget for constructing the exhibits themselves was nearly twice that of the building's \$26 million base contract construction budget.

### PRICELESS ARTIFACTS

If the museum has a "jewel in the crown," it would be the 3,000-sq-ft flexible exhibit area (FEA). On any given day, visitors to the FEA can find the rarest of Lincoln artifacts on loan from collections around the country, including the carriage in which the Lincolns rode to Ford's Theater and pieces of Lincoln's jacket and blood-stained shirt and gloves.

Naturally, the historical societies and private collections that loan priceless historical artifacts like these do so with the assurance that their preservation is guaranteed in an environment with the most precise temperature and humidity controls. In fact, the FEA was required by the Federal Historic Preservation Agency to maintain a constant cool 68°F, low 45% relative humidity level, and held to just + 1% year-round, around the clock. Then factor in additional requirements like the ability to handle the heat loads that change drastically minute to minute because of the sheer number of visitors in the space, and the need to respond exceptionally fast with alarming and reporting data should humidity or temperature change by even 1%. It was obvious to the building's owner, the Illinois Historic Preservation Agency (IHPA), that no ordinary BAS would be needed in order to maintain the required level of control and monitoring over the HVAC system.

### PRECISION CONTROL

Schneider Electric's Rockford, IL-based partner, Alpha Controls & Services, was tasked by the IHPA to provide all the engineering, programming, installing, and commissioning of the building's HVAC and management systems.

They responded to the challenge by using six Schneider Electric I/A Series® MicroNet controllers to control each of two special Trane 4,000 cfm air-handling systems used to provide the conditioned air to the FEA. The MicroNet (MNL 800) controllers are fully programmable, interoperable, LonWorks®-based control devices featuring universal inputs, analog outputs, and digital outputs.

Museum-wide, Alpha Controls ultimately installed a total of 100 Schneider Electric I/A Series® MicroNet VAV controllers, tied to a series of Schneider Electric S-Link Sensors and 10 Trane air handlers, to monitor and control energy consumption for the entire museum.



One hundred VAV controllers are tied to a series of sensors and AHUs to maintain the collection of priceless artifacts at the Abraham Lincoln Presidential Library in Springfield, IL.

### BRAINS AND BRAWN

While the I/A Series provides the 'brains' of the BMS, Bernardi is quick to point out that the system couldn't function with its extraordinary precision and reliability without the 'brawn' that comes from dozens of reliable Schneider Electric field devices.

For example, the DuraDrive damper actuators used to open and close the Trane air handler dampers must meet very precise torque requirements day-to-day throughout the life of the system as they open and close repeatedly throughout the day in response to constantly changing heat loads. Failure to do so could be catastrophic, says Bernardi, given the tight temperature and humidity requirements of the museum.

As the requirements for the FEA indicate, maintaining the ideal low relative humidity is absolutely critical to preserving these rare artifacts. The Trane CDQ wheel uses a patented process to greatly improve HVAC de-humidification performance. The wheel is configured in series with the cooling coil, such that the "regeneration side" of the wheel is located upstream of the coil and the "process" (air going to the space) side of the wheel is located downstream of the coil. The CDQ desiccant wheel absorbs water vapor from the air downstream of the cooling coil and then adds it back into the air upstream of the coil where the coil removes it through condensation. The addition of the CDQ desiccant wheel greatly enhances dehumidification performance of the traditional cooling coil.

### TYING IT TOGETHER

"With the success of the museum, we ultimately concluded that we needed the same flexibility, responsiveness, and control in the Lincoln Library, where another vendor's system already existed," says Otegeson. "Alpha Controls was able to easily tie this third-party system to the museum's existing I/A Series Enterprise Server, giving us total control over both facilities.

The 98,000-sq-ft Lincoln Library, right next to the museum, houses some 12 million books, documents, and artifacts. A special 33,000-sq-ft storage facility contains some six miles of shelves, microfilm, and manuscript collections, and assorted classrooms, displays, and exhibits. According to Otegeson, the temperature and humidity tolerances for

the storage facility are practically as critical as those required in the museum's FEA. Now, with the power of the I/A Series, he or any of his small maintenance team can monitor the buildings 24/7 even from home, and they are made instantly aware of even the smallest temperature or humidity 'spikes' that might require corrective action.

Meeting the HVAC requirements of the newly opened Union Station Visitor Center, strategically located across from the Abraham Lincoln Presidential Library and Museum, presented still another challenge for Alpha Controls and Schneider Electric. This was formerly the Springfield Union station, a railroad passenger terminal built in the late 1800s. Most recently, the structure sat vacant and fell into disrepair. The building was extensively restored as the Lincoln Library's visitor center, reopening in March 2007. Ortegesson says that the challenge for this building, given its age, large number of visitors and a strong solar component, was achieving the right balance between comfort and energy efficiency.

"Because of the way the building is designed and situated, we have to contend with a strong solar effect that requires the three air handlers to bring in cold air even in winter to maintain the proper temperature set-points for this space," explains Ortegesson. "At night, we have setbacks

for the building to conserve energy, as opposed to the other buildings that stay at a constant, 24/7. It's a balancing act that the system installed by Alpha Controls manages nicely. Now we can meet the quality requirements of the Museum and Library — and the flexibility needs of the Union Station — with one system that does it all." **ES**



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