CASE STUDY:
Illinois State Archives

Humidity problem solved at Illinois State Archives

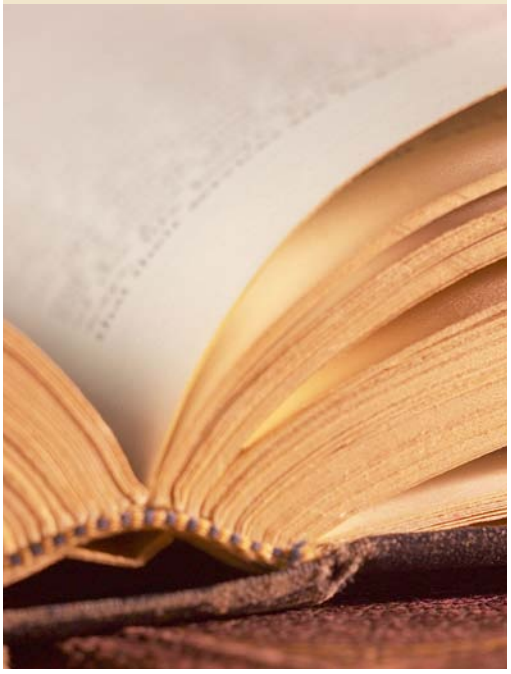
Maintaining the ideal level of humidity is important in most homes and businesses, but it is critical for archive facilities such as the Norton Building in Springfield, Illinois, home to the Illinois State Archives. This library contains, among other important papers, a collection of Abraham Lincoln's handwritten documents. Built in 1938, the 12-story structure had been battling a humidity problem for years. Consequently it was in need of repairs to fix leaks, an effect of moisture related issues, that can jeopardize the building's purpose of literary preservation.

The Problem

In 1998 the Norton building's HVAC and dehumidification systems were revamped. Unfortunately, the whole HVAC system wasn't working properly, especially the critical dehumidification equipment. In 2001 another engineering firm, GLHN Architects and Engineers of Tucson, Arizona, was asked by Illinois' Capital Development Board (CDB) to investigate the poor performance of the archives building and to make recommendations.

"There were clear errors in calculations that led to the HVAC system, including the dehumidifier, being undersized," said GHLN engineer Jim Kreutzmann, who led the project.

The critical spaces, the vaults where the microfilm and paper records were stored, were not isolated from the rest of the building. They were receiving the same air as the office area despite the fact that the vaults required 65°F dry bulb and 40% relative humidity to protect the documents and film, much lower than the comfort cooled air supplied to the offices."



BENEFITS

- 100% outside air
- Precooling
- Winter heating
- Building pressure control

Munters

GLHN recommended the addition of partitions to isolate the vaults so they could maintain their own conditioned air under positive pressure.

"It was a big and expensive project, but the CDB recognized it was necessary to preserve the documents," said Kreutzmann.

In addition to erecting partitions, they also installed automatic doors at the tunnel entrance and at the elevator lobby.

"These additions gave us the ability to control air flow," said Kreutzmann. "Without that control, keeping the humidity at the desired level in vaults would have been impossible."

Next they addressed the undersized HVAC system.

Another company's dehumidifier was originally chosen, but quickly feel short of CDB's expectations.

"The unit they proposed just wasn't right," said Kreutzmann. "It lacked capacity and wasn't reliable."

One main problem was that most desiccant wheel dehumidifiers use return air and heat to remove accumulated moisture from a desiccant wheel. In this case, since the building leaked air, 100% outside air was required for pressurization, so there was no return air. The unit would have to use outside air and that would require more heat than normal because the outside air would be more humid than typical return air would be.

After facing many other hurdles with the dehumidification system, the CDB agreed that the only solution was to replace the current dehumidification system with one originally proposed by Munters.

Munters to the Rescue

Munters engineers got to work and developed a custom system to fill the unique needs of the Norton Building.

"Most desiccant wheel systems pre-condition air for the air conditioning unit to remove the burden of dehumidification and increase system efficiency," said Larry Borges of Climatec, the representative of Munters in Tucson. "This configuration was unusual because so much outside air was required to replace that which leaked out of the building. The York units cooled and recirculated the air in the building and the Munters unit dumped dehumidified outside air directly into the building."

The customized Munters dehumidifier uses conventional refrigerant driven air conditioning coils to precool 100% outside air prior to its passing through the desiccant wheel to removes the excess moisture. The air then passes through a post cool DX system that brings it to a neutral 62°F and releases it into the building where the floor-by-floor air-handling units condition and circulate it.

In the winter, heating coils in the unit using low pressure steam preheat the dehumidified air to the same temperature before releasing it in the building. In the sealed vaults, their air handlers maintain temperatures at the desired 65°F dry bulb and 40°F relative humidity. Dehumidifying all that outside air was where the Munters engineers made the difference.

"This is where pressure steam was needed. That's one place that the other system was improperly designed. Low pressure steam couldn't provide enough heat for the dehumidifying process," said Kreutzmann. "The Munters engineers knew that and insisted that a separate high pressure line be run. Now we had a dehumidification system that was big enough to handle the needs of the building."

The Result

"Everything is a lot better now," said Brady. "Even on the 12th floor right under the roof where the temperatures were up to 74°F in the vaults with the old system, the air is as cool and dry as the specs say it should be. The Munters unit is great. It makes the building as dry as the Mojave Desert in just hours."

(*Above*) A crane removes the old dehumidification equipment from the building rooftop. (*Top Right*) A more efficient and effective Munters humidity control system was installed.

Munters Corporation
Tel: (800) 843-5360
E-mail: dhinfo@munters.com
www.munters.us

Munters