



Uponor

RADIANT HEATING AND COOLING SYSTEMS

MUSEUM

CASE STUDY

Museum Displays Comfort with Radiant Heating and Cooling

When the Hunter Museum of American Art in Chattanooga, Tenn. reopened with its award-winning new addition, the first show was Georgia O’Keeffe: Visions of the Sublime.

O’Keeffe, one of the world’s most iconic artists, was most fitting to open for the new \$19.5 million expansion of the Hunter Museum — a sleek, contemporary building on the bluffs overlooking the Tennessee River — sure to become an icon on its own.

The new addition was part of the city of Chattanooga’s 21st Century Waterfront Plan, a \$120 million downtown riverfront renovation project.

Since this project was obviously of grand-scale proportions, the contractor and engineers needed to be especially conscientious of the aesthetics of the museum as well as the precious works of art housed inside.

The environment had to be perfect — especially the grand lobby, where hundreds of guests would enter through the glass doors every day to experience the finest in American art.

So, how does a 5,000-square-foot lobby with soaring, 30-foot glass windows and no possible place for duct work possibly get the most comfortable environment for both patrons and artwork alike? The contractor and engineers had their work cut out for them. But their solution was actually the simplest and easiest for design, installation, maintenance and reliability — radiant floor heating and cooling.

John Giles, president of ACS Services, Inc., was the installing contractor for the Hunter Museum project, and has been installing radiant floor heating since 1998. Since the Hunter required especially stringent temperature constraints, radiant cooling had to be incorporated as well.

“Although this was the first radiant floor cooling installation for ACS, the entire installation went quite efficiently,” says Giles. “We began installation in February 2005 and it was completed the following month.”

Giles states one aspect of doing radiant cooling in the southern states is addressing the issue of humidity when designing the system.



Museum guests appreciate the comfort provided with the radiant heating and cooling system.

The condensation point of the radiant cooling system needs to be controlled to avoid condensation forming on the floors.

Scott McKenzie, project engineer for March Adams & Associates, the engineering firm hired to facilitate the Hunter Museum addition, explains how the issue of condensation was addressed when designing the cooling portion of the system.

“We are controlling the radiant cooling aspect of the floor by maintaining the floor at five degrees



above the outside air dew point," says McKenzie. "This prevents condensation on the floor while providing radiant cooling and immediate absorption of heat due to direct sunlight."

Another challenge the Hunter Museum posed was how to control the dramatic temperature changes that can occur when a large influx of patrons enter and exit the lobby. According to McKenzie, going with a radiant system was the most

economical way to maintain a comfortable, consistent environment.

"One of the major design problems we foresaw was that the museum has an extensive outreach program and lots of school children enter the building," says McKenzie. "Your occupancy load can go from zero to 200 in a matter of 20 minutes. But the radiant gives a nice, stable mass while providing comfort at floor level where visitors are located."



The 5,000-square-foot project was completed in less than two months.

Summary of Benefits

Superior Environment Control

Since the Hunter Museum has a constant fluctuation of traffic coming through the doors, the temperature changes can vary dramatically. Radiant heating and cooling gives the grand lobby a consistent, comfortable environment.

Aesthetically Pleasing

Because the grand lobby has 30-foot windows on an exterior wall along with stone flooring, the aesthetically pleasing value of radiant, which is hidden in the floor, is the best choice for an upscale environment.

Cost Efficient

Radiant heating and cooling is the ultimate in comfort with the best economy. The Hunter Museum saves an estimated 30% on heating and cooling costs with the radiant system in the grand lobby.

Thorough Design

The design and installation manuals are excellent tools to explain the design possibilities and constraints on a project. Uponor technical support is also helpful at providing solutions and insights on the job.

Project Data

Type of Structure:	Grand lobby in The Hunter Museum of American Art
Total Heated and Cooled Square Footage:	5,000 square feet
Floor Construction:	80% slab on grade; 20% slab with basement below; 8" concrete subfloor; 1" high-density foam board insulation; 2" top pour with 6 x 6 wire mesh for tubing attachment
Floor Covering:	Stone
Outside Design Temperature:	13°F
Room Setpoint Temperature:	70°F
System Supply Water Temperature:	Heating — Primary loop supply header: 110°F Secondary floor loops: 95°F with reset Cooling — Primary loop supply header: 2°F above dew point Secondary floor loops: 5°F above dew point
System Flow:	14 gallons per minute (gpm)
Pumps:	3 circulating pumps (2 at 4 gpm; 1 at 5 gpm)
Tubing Type:	½" Wirsbo hePEX™ plus
Feet of Tubing:	6,000 feet
Number of Loops:	18
Average Loop Length:	330 ft.
Tubing Spacing:	6" on center around perimeter of room 12" on center in center of room
Number of Manifolds:	3
Number of Heating and Cooling Zones:	11

The design information in this case study is provided for illustrative purposes only. The actual requirements of similar projects will depend on regional climatic conditions, project-specific heat loss, owner expectations, applicable building codes, etc. Please contact your Uponor representative for assistance in designing your specific projects.