When creating a 32°F (0°C) space in hot and humid Orlando, the efficiency of the systems and envelope is crucial. The facility is designed to minimize energy use while providing a habitat for penguins to thrive.

FIRST PLACE
COMMERCIAL BUILDINGS, EXISTING

Antarctica
Empire of the Penguin

Photo Credit: SeaWorld

BY WILLIAM C. WEINAUG JR., P.E., MEMBER ASHRAE

BUILDING AT A GLANCE

Antarctica
Empire of the Penguin

Location: Orlando, Fla.

Owner: SeaWorld Parks and Entertainment

Principal Use: Theme park attraction

Includes: Dark ride and penguin exhibit

Employees/Occupants: 300

Gross Square Footage: 66,990

Conditioned Space Square Footage: 66,990

Substantial Completion/Occupancy: April 2013

Occupancy: 75%

Antarctica: Empire of the Penguin is an immersive dark ride and penguin exhibit. The 30,000 ft^2 (2787 m^2) project was a renovation and addition to the existing Penguin Encounter building at SeaWorld Orlando.

Guests enter the facility through a pre-show theater, pass into a rock and ice themed queue, and exit the queue through a small "ice den" to load onto a unique trackless ride system. The vehicles move through various scenes, including a large theater space, ending at an unload platform inside the frozen penguin exhibit. The adventure concludes in an underwater viewing area.

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CosaTron systems

Odor Control

Odor control in penguin exhibits is often a struggle for HVAC designers. Typically, animals are physically separated from guests making control simpler. However, in this project guests are allowed to flow freely into and out of the exhibit through openings large enough to accommodate the ride vehicles.

Based on positive past experience, the design team recommended the use of excitation technology via a "non-homogenous, in-unit electrical field" to help control odor. Such a system increases the rate of collisions among the suspended particles in the HVAC system's airstream, causing an increase in particle size by combining these submicron particles. The particles both absorb and adsorb odor. As particle sizes increase, the HVAC filters can trap them along with the odor. The large recirculating air-handling units that house these electrical grids are located above the exhibit.

In addition to providing special excitation technology and the highest level of filtration, HVAC systems serving areas surrounding the exhibit were fitted with titanium dioxide catalytic filtration systems. The design team felt employing these two technologies would afford us the best possible odor control approach for the facility.

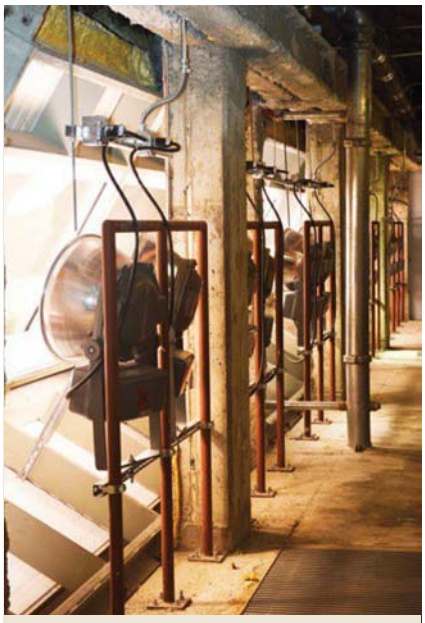

Photo Credit: SeaWorld

Light fixtures were placed outside the cold envelope to minimize heat gain in the exhibit.

Energy Efficiency

When creating a 32°F (0°F) space in hot and humid Orlando, the efficiency of the envelope and the systems serving that space are crucial to keep operating costs at a minimum. As noted earlier, the design team's first task was to reduce the effect of the outdoor conditions by ensuring the coldest and driest areas (less than 50°F [10°C]) were properly encapsulated by a thermal panel system with excellent insulation and vapor barrier characteristics. A high quality freezer panel system was used to provide this barrier. In addition, temperate, low dew point zones surround the coldest areas. Very efficient liquid desiccant systems with ERV (air-to-air total energy plate heat exchangers) perform dehumidification work in these areas. Sally ports and revolving doors help maintain the envelope around the low dew point areas while allowing thousands of guests to enter each hour.