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HORSESHOE CASINO

CASE STUDY

Players at the Horseshoe Casino in Tunica, Mississippi, are luckier than most — not necessarily because they win more money, but because they're breathing cleaner, fresher air since new ventilation and air filtration systems were installed.

The before and after picture is clear, according to George Byers, Director of Facilities at the Horseshoe Casino & Hotel Tunica. Complaints from guests about smoke and other odors have virtually disappeared.

Yet the project is a big win for the casino as well. The new air-quality equipment recovers energy from both the incoming air and the exhaust stream, yielding savings that compensate for ventilation costs.

POPULAR GAMING SPOT

The Horseshoe facility, on the Mississippi River an hour south of Memphis, features a huge gaming floor of 78,000 square feet, plus 507 hotel rooms, five restaurants, and three bars with entertainment. The casino sits on a 90,000-square-foot barge floating in the river. The second and third floors above the casino have deluxe hotel rooms and a swimming pool on the second-floor deck.

A newer, 14-story hotel tower with a health spa was built on land, but connected with the rest of the barge complex so that guests never have to go outdoors to access the casino or other amenities. The restaurants surround the casino area, while the bars and entertainment lounges are integrated with the gaming floor.

Occupancy rates at Horseshoe testify to the casino-hotel's popularity. The hotel is 100% full nearly every weekend and in the high 90% range during the week. The occupancy of the 24-hour casino is hard to quantify at any given time, but thousands of people are usually playing during its busy times, from late afternoon into the wee hours.

Holidays are the most popular occasions for the casino, as well as certain days of the month and special events such as the World Poker Open held in January 2004. At the casino's occupancy peaks, some 15,000 to 17,000 people might be playing.

SMOKING ISSUES

Like many casinos, Horseshoe allows smoking throughout the gaming floor, and the hotel facilities have only a few nonsmoking areas. “In the casino, smoking is heaviest in the poker room, at the pit gaming tables, and in some groups around the slot machines,” says Byers. However, the concentration of smoke at any particular time and spot is difficult to predict.

Historically, smoking has been associated with activities such as alcohol consumption and gambling. In some states with a high percentage of smokers, casino patrons who smoke could account for one-third of all customers, while their non-smoking spouses or travel companions could represent another 30%.

The rules governing acceptable levels of air quality when it comes to smoking have been a hot topic for years. Owners of bars and taverns, who claim that substantial loss of business would result, have furiously debated statewide anti-smoking laws.

New air-quality guidelines developed by ASHRAE were being reviewed in draft form in early 2004, and ASHRAE has been working with the gaming community to clarify the rules. The standards, once finalized, would have to be adopted into local building codes before being enforced.

But as anti-smoking fervor spreads from California into the Heartland, casinos could encounter more objections from guests who don’t smoke, as well as difficulty meeting new local regulations. And evidence continues to mount that extreme amounts of secondhand smoke affect nonsmokers. A University of Minnesota study found highly elevated levels of carcinogens and nicotine-related compounds (NNAL and cotinine) in non-smoking people who spent 4¼ hours in a casino smoking area.

BEST OF BOTH WORLDS

But the Horseshoe Casino & Hotel has managed to provide fresh air for both smoking and non-smoking guests, as well as its staff, making it a leader in the gaming industry. As a result of Horseshoe’s $2.2 million air quality improvement project, the indoor environment is comfortable and healthy, without a smoking ban. “We are very pleased to offer our patrons and employees a cleaner atmosphere,” says Bob McQueen, Horseshoe’s General Manager.

The solution at Horseshoe was fairly simple: bring in huge amounts of outside air and keep it flowing through the gaming floor. However, the problem was how to do this without exorbitant operating costs. The casino’s location in the steamy Mississippi Valley translates to high temperatures and humidity levels throughout most of the year. Conventional air-conditioning equipment cannot handle high humidity loads effectively, since it is designed to reduce temperature, not remove moisture.

The key to providing maximum ventilation at minimum cost was the installation of four energy-recovery systems manufactured by SEMCO®, (Columbia, Missouri) to supply fresh air to the casino. Each EPH system provides 40,000 cubic feet per minute (cfm) of outside air, for a total of 160,000 cfm; the exhaust rating is 34,500 cfm per unit.

The EPH package features a desiccant wheel that captures energy from the incoming air and from the building exhaust. The units offer the highest performance on the market, in terms of total energy recovery (sensible and latent), with an efficiency rating of 80%. In the cooling mode, the rotating wheel dehumidifies the outside air and transfers its heat to the exhaust stream. In the heating mode, the desiccant captures heat and moisture from the exhaust air to warm and humidify the incoming air.

In addition to the casino’s systems, an air “pre-conditioner” was added to serve the employees’ lounge. The FV-3000 unit, also made by SEMCO, supplies 3000 cfm of outside air that has been pretreated by the desiccant wheel. The FV unit reduces the energy required to cool or heat outdoor air by up to 80%, allowing the lounge’s existing DX package unit to handle large amounts of ventilation air more effectively and economically.

“Our cooling coils are not getting one hundred-degree air anymore,” says Byers. “The temperature is reduced to around seventy-five degrees, making it easier to cool and using less energy.”

ELIMINATING CONTAMINANTS

All of the units feature SEMCO’s True 3Å® total energy recovery wheel, which uses a highly selective molecular-sieve desiccant material with a minuscule pore size (3 Angstroms).

Exhaust air from casinos and other buildings can contain pollutants such as tar and nicotine, as well as off-gases from carpets and construction glues and solvents – all potential contributors to poor air quality. However, the desiccant adsorbent rejects these airborne contaminants, which are passed outdoors. Independent laboratory and field testing has documented that cross-contamination between air streams cannot occur.

In addition, Horseshoe’s air-quality project design incorporates three-stage filtration. This involved upgrading the filter systems on 18 existing air-handling units. The building’s supply air now goes through a medium-efficiency pre-filter, a high-efficiency particulate filter, and an odor absorbing carbon filter.

“Without air filtration, we would have needed about three hundred thousand cfm of outside air, which would’ve been physically impossible,” explains Steve Wilson, Principal at Mills-Wilson-George (Memphis Tennessee) and SEMCO’s local sales representative. The ASHRAE 62-2001 standard would have required 30 cfm of outside air per person, but the air filter upgrade reduced this by half, to 15 cfm/person.

RETROFIT INSTALLATION

According to all of the people involved in the Horseshoe retrofit, the project was amazingly smooth. No significant problems were encountered during construction or initial operation, and the whole process from concept to start-up took less than 8 months.

Horseshoe’s existing variable-air-volume (VAV) HVAC system incorporates banks of chillers that feed the individual air handlers, which are scattered throughout the gaming area. The air handlers load and unload automatically, depending on the occupancy surrounding them, which fluctuates widely. At any point, some air handlers might be running low or turned off, while others are delivering maximum output.

During installation of the energy-recovery units and the air-filtration upgrade, Horseshoe wanted to avoid disturbing any hotel guests or players, so work times were restricted. “We could not shut down one square inch of that casino,” says Wilson. This required that work be done on the third shift, from midnight to 7:00 a.m., on the casino’s EPH units, and after 8:00 a.m. on the employees lounge FV unit.

Byers says, “We were able to integrate the equipment without interrupting business. Most customers didn’t even realize we were doing the project.” He notes that two of the EPH units were installed next to the swimming pool on the casino’s second-floor deck, behind a six-foot-high wall. Noise levels were acceptable, but to enhance the wall’s monolithic appearance, Byers came up with the idea of hanging a sheet of material that looks like a boat sail. Although the material is translucent, it disguises the wall and equipment and makes the area look more attractive.

MINIMIZING COSTS

Before the project got under way, design analysis was performed by Steve Stephens, P.E., of Morgan & Thornburg, Inc. (Memphis, Tennessee), the mechanical contractor. Stephens was responsible for analyzing energy loads, sizing equipment, and custom designing the system, with support from sales representative Wilson.

Horseshoe was concerned primarily with improving its casino’s indoor air quality. “We didn’t want to spend an arm and a leg,” says Byers, “but at the end of the day, we wanted people to stop noticing smoke from cigarettes, cigars, and pipes. We wanted to smell fresh, clean air.” The new system has proven effective in maximizing indoor air quality while minimizing wasted energy, according to Steve Thornburg of Morgan & Thornburg. The customized design meets ASHRAE standards and accomplishes Horseshoe’s goals.

In operation, the retrofit HVAC system costs about the same to run, Byers says, despite the additional electricity consumed by fan and blower motors and other equipment associated with the greatly increased amounts of outside air. That’s because the energy recovered by the SEMCO units provides the equivalent of 815 tons of cooling, reducing the conventional system’s load by 61%, from 1,340 tons to 525 tons for the additional outside air load. No upgrades were required for the chillers, pumps, or cooling tower to operate the system with 160,000 cfm of outside air.

“The energy use from the associated ventilation equipment is offset by money saved in operating costs,” Byers says. Bottom line: The indoor atmosphere is dramatically fresher, cleaner, and healthier, yet it costs little or nothing more to maintain.

LOOKING BACK

“In retrospect,” says engineer Steve Stephens. “I do not believe anything on the design could have been changed to make it more efficient. Each item was thought out by the team and the best option put forward.” Stephens recommends SEMCO units for applications with high fresh air loads associated with fluctuating occupancy.

The system has been performing as advertised since its installation, says sales rep Wilson. “We haven’t had any problems, and the owners are tickled to death.”
Would George Byers recommend SEMCO’s EPH and FV products to other casino facility managers? “Absolutely,” he says.

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