FläktGroup®
SEMCO®

HILTON GARDEN INN
DOWNTOWN ATLANTA
CASE STUDY

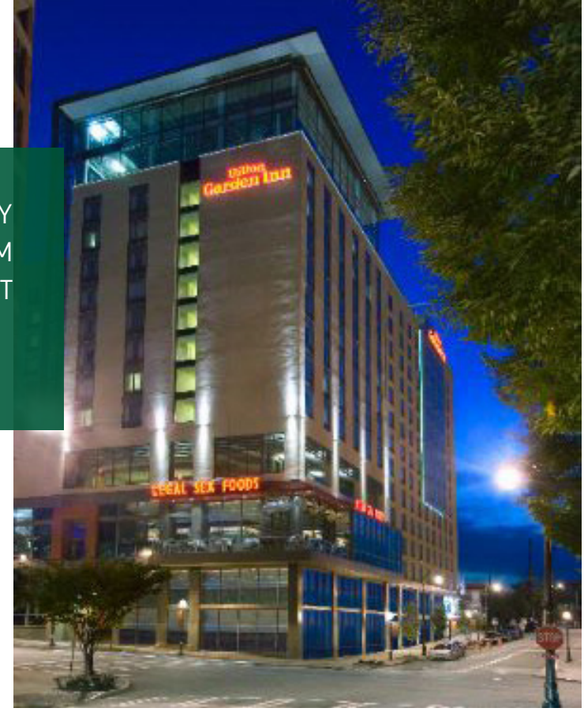
TACKLING IAQ, COMFORT AND EFFICIENCY WITH SEMCO PINNACLE® UNITS
HILTON GARDEN INN, DOWNTOWN ATLANTA

The Hilton Garden Inn in downtown Atlanta, Georgia is doing more than using recyclable coffee cups to prove its commitment to sustainability – a lot more.

The hotel, completed in 2008, has one of the most sophisticated energy recovery systems available to commercial facilities. The inclusion of two FläktGroup® SEMCO® Pinnacle® Energy Recovery Units in the hotel's mechanical design not only provides year round savings in heating and cooling costs, it also bumps the indoor air quality up to a whole new level.

"WE LOOKED AT OTHER TYPES OF ENERGY RECOVERY EQUIPMENT BUT NONE OF THEM COULD COMPETE WITH THIS PARTICULAR UNIT IN TERMS OF CAPACITY AND EFFICIENCY."

- Bill Ehle, Mechanical Engineer



B & A Consulting Engineers of Decatur, GA chose to include the FläktGroup SEMCO units as a way to efficiently improve comfort and lower humidity while still bringing in a large volume of outside air. The energy recovery units, which are installed on the rooftop of the hotel, utilize continuous guestroom toilet exhaust and some general exhaust to pre-condition outside air, relieving in-room units of any latent load. The supply air from the Pinnacle® units pressurizes the hotel's corridors and common areas with semineutral, dehumidified air. The supply air is dry enough so that any build up of moisture inside the guestrooms is either exhausted via bathroom exhaust or absorbed by the hallway areas. Humidity is kept comfortably low (50% or lower) during the cooling season, which not only improves comfort; it helps prevent any mold issues from occurring inside the hotel.

CUSTOM DESIGNED FOR EFFICIENCY

The units selected for the Hilton project were customized to fit the hotel's overall mechanical design, which includes a cooling tower and some heat pump capacity. With the availability of a water source loop, the FläktGroup SEMCO units were designed to include a water-cooled condensing section to further optimize efficiency. The cooling season operational sequence of the units is illustrated in Figure 1.

Outdoor air enters the unit, passing through a filter and then the total energy (enthalpy) heat wheel where heat and some moisture is transferred to the adjacent exhaust air stream. Supply air then passes through a cooling/condensing coil, which modulates according to the supply temperature and dew point set points. (One Pinnacle® unit contains two separate refrigeration circuits, one variable speed and one constant speed, to operate, as needed depending on demand.) As the air passes through the coiling coil, it is cooled to saturation to remove more moisture from the air and lowers the temperature to approximately 55˚F. Next, the air passes through the passive dehumidification wheel, which warms the air back up to suitable 67˚F and removes even more moisture so that final supply air humidity is approximately 48˚ dew point.

WINTER TIME BENEFITS

Those applying the Pinnacle® unit often focus on its benefits associated with the dehumidification cycle in the cooling season, but an equal benefit is the energy savings associated with the wintertime operation.

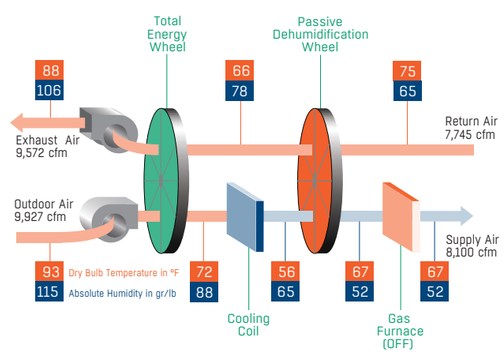


Figure 1: Schematic of the cooling season sequence

Many energy recovery manufacturers design their systems such that both wheels are not utilized in the heating season. The reasons for this is to protect the cooling coil from freezing, prevent the enthalpy wheel from condensing and frosting, and sometimes the process that has been implemented prohibits use. If the second wheel in the system is not utilized, it causes a negative impact on the energy savings, as the owner would be paying for the static pressure of the second wheel in the "non-dehumidification" season.

FläktGroup SEMCO's system is designed so both wheels can utilize the exhausted air in the wintertime to provide the owner with additional energy savings and offset the horsepower penalties associated with the second wheel. During the summer months, the Pinnacle® system saves upwards of 60% of the tonnage associated with 3/4 of the building load served (outdoor air temperature load, outdoor air humidity load, and the building internal humidity load). In the winter time, the two wheel system can reduce the heating load requirement associated with the outdoor air by as much as 90%.

FläktGroup SEMCO's integrated controls on the Pinnacle® system monitors the wheels and coil temperatures to prevent condensation and frosting on the enthalpy wheel. For the Hilton Garden Inn, a DX cooling coil was utilized to prevent freezing of the coil in the heating season. This means the owner can have full use of the second wheel in peak winter conditions. As shown by Figure 2, the two wheels take the air from 18 degrees to 65.6 degrees and only need 82,612 btu/h of heating capacity to achieve a 75 degree supply condition at 8,100 cfm. A conventional system, without heat recovery, would require over 500,000 btu/h of parasitic heat to achieve the same heating capacity. Additionally, if a single wheel unit were applied, typical performance would require 147,645 btu/h amount of additional heating capacity. This shows the Pinnacle® saves over 418,000 btu/h of heating capacity (or 83.5%) compared to a conventional system and 65,033 btu/h of heating (or 44%) compared to a typical single wheel system.

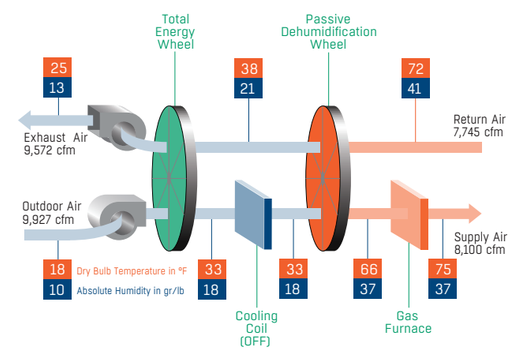


Figure 2: Schematic of the heating season sequence

"We looked at other types of energy recovery equipment but none of them could compete with this particular unit in terms of capacity and efficiency," said Bill Ehle, mechanical engineer on the project.

In addition to efficiency, the engineers liked the fact that the Pinnacle® unit has the lowest heat wheel cross contamination rate in the industry. This allows the hotel to use continuous exhaust from the bathrooms to a positive, energy efficient advantage.

Occupants may not notice the fact that their room units are running less often (due to the neutral air being supplied to the corridors) but the frequent business traveler with a keen sense of smell probably will notice the Hilton Garden Inn's air is a bit fresher than your average hotel. That makes superior IAQ a smart investment for any hotel hoping to establish its brand loyalty.

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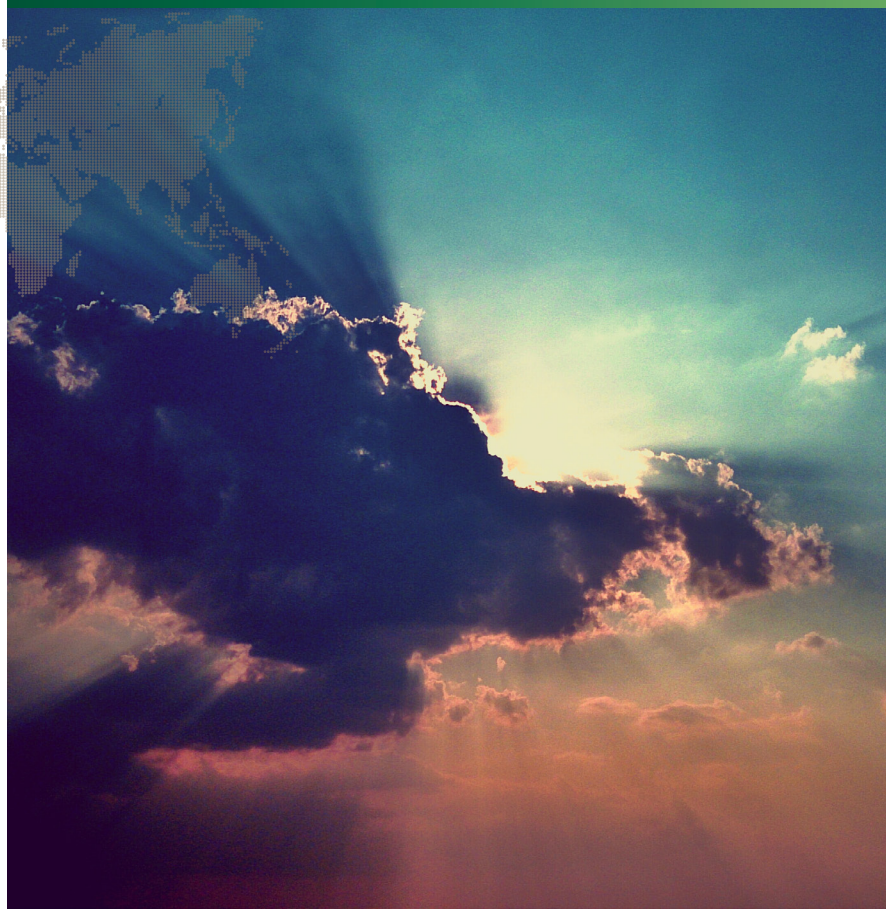

FläktGroup® SEMCO® is a global leader in air management. We specialize in the design and manufacture of a wide range of air climate and air movement solutions. Our collective experience is unrivaled.

Our constant aim is to provide systems that precisely deliver the best indoor air quality and performance, as well as maximize energy efficiency.

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