



# Case History

## **SUPERCHANGER's "Free Cooling" Brings High-rise Complex 57% Energy Savings, Full Payback In Less Than 18 Months**

Colony Square, a metropolitan Atlanta high-rise complex comprising one hotel, two towers, three condominium buildings, one large mall and a number of small buildings, has experienced reductions in energy consumption of up to 54.7% since installing two SUPERCHANGER plate and frame heat exchangers in its HVAC system in 1980.

This substantial reduction is the result of the heat exchanger's ability to bypass chillers during moderate temperatures. Called "free cooling" the bypass operation has consistently won energy savings awards for Colony Square.

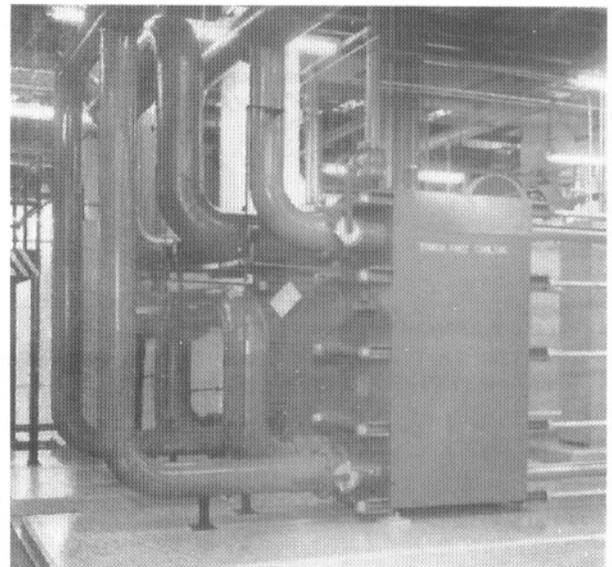
The Model UX-416-HP-241-304/NBR Tranter SUPERCHANGER exchangers are installed in a bypass circuit so that the chillers can be shut down whenever outside temperatures drop below 45°F. Each time the SUPERCHANGER units go into operation, 480 tons of refrigeration is obtained without the high cost of electricity to run the project's three, large 1250-ton centrifugal chillers. This is a savings of approximately 600 kwh per hour!

Installation of the plate and frame heat exchangers was first recommended to Carter & Associates, Inc., developer and manager of the high-rise complex, by Ashok B. Bhatt, P.E., design engineer with Natkin Energy Management of Englewood, Col., according to Jose Peraza, director of mechanical services for Colony Square.

"Natkin Energy had done numerous feasibility studies and actual installations of SUPERCHANGER units and heartily recommended their use in our specific operation. They conducted a feasibility study here to confirm its recommendation. We haven't regretted it. We not only see energy savings constantly, but we had full payback in less than 18 months," he says.

"The SUPERCHANGER units are beautiful pieces of equipment," he continues, "because they're virtually trou-

ble-free. The only thing we've had to replace since they were installed are a few gaskets. They're maintenance free, too."



Colony Square's central plant works the year around, 24 hours a day, and produces some 16 billion Btu's each month. In addition to the three chillers, there are two 42-million Btu/hour boilers and two 650 HP steam boilers in the system. In addition to "normal" heating and cooling operations, the system serves a number of businesses with elaborate computer operations.

SUPERCHANGER units are manufactured by Tranter, Inc., and are used widely for "free cooling" in many areas of North America where climate and wet bulb conditions are favorable. Sizeable energy savings are the usual result, installation records show.

When asked if Colony Square would install SUPERCHANGER heat exchangers all over again if given the opportunity, Peraza states enthusiastically, "We're going to do even better than that!" He indicates that Natkin Energy is presently conducting a new feasibility study to determine if additional SUPERCHANGER units can provide 1000 tons of refrigeration without the bypass circuit.

"My money's on the additional SUPERCHANGER units," he says, "because the two we're using now have been money-makers for us!"



**SUPERCHANGER**

Each SUPERCHANGER exchanger furnishes 1955 sq. ft. of heat transfer area through 241 plates. Water is circulated in both hot and cold sides at a flow rate of 1500 gpm each side. The air conditioning water enters the exchanger at 60°F and leaves at 53.5°F. The tower water enters at 50°F and leaves at 56.5°F. The tower water enters at 50°F and leaves at 56.5°F for a 3.5°F approach and a transfer of 4.88 million Btu/hr per exchanger.

**Calculations of Annual Savings from Free Cooling at Colony Square**

1. 3-1250 ton chillers - when not running - saves:  

$$800 \text{ amps @ } 480 \text{ V} = \frac{(800)(480)}{1000} = 384 \text{ KW}$$
  
2. There are 2 circulating pumps per chiller. When the chiller is not running the primary pump for each chiller shuts down.  

$$3 \text{ pumps @ } 100 \text{ HP each} = (3)(100)(.745 \text{ KW/HP}) = 224 \text{ KW}$$


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Total KW Reduction When Chillers are Off = 608 KW
  
3. When daytime ambient wet bulb temperatures average 45°F or below the chiller shuts down an average of 6 hrs/day. Weather Bureau data for October through April shows that this condition exists for 82 days. Energy cost is based on \$0.06/KWH.  

$$(608 \text{ KW})(6 \text{ hrs/day})(82 \text{ days/yr})(\$0.06/\text{KWH}) = \$17,948.00/\text{yr}$$
  
4. When nighttime ambient wet bulb temperatures average 55°F or below the chiller shuts down an average of 6 hrs/night. Weather Bureau data shows that this condition exists an average of 212 days/yr.  

$$(608 \text{ KW})(6 \text{ hrs/day})(212 \text{ days/yr})(\$0.06 / \text{KWH}) = \$46,402.00/\text{yr}$$


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average annual savings = \$64,350.00/yr



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