
CASE STUDY

McQuay Rooftop Equipment's Value Pays Off For Paychex Building In San Diego

Rooftop VAV systems are considered by some to be almost a commodity item. That's why many developers and design build contractors focus on the cost per ton price--to the exclusion of other, more important factors such as energy efficiency, service and maintenance access, building pressurization and noise levels.

Local McQuay Representative Delta-T Systems, Inc., in San Diego, CA found themselves in just that type of situation when they were making a bid to equip the Paychex Building with McQuay rooftop units. Paychex, a leading national provider of payroll, human resource and benefits outsourcing solutions across the U.S., was building a new 2-story building to house their offices and provide office space for a few select tenants. Paychex management was extremely cost conscious about constructing the building, but they were open to suggestions about how to get the most value from their investment dollars.

DEC Engineers, the consulting mechanical engineer, and Delta-T Systems did their homework and sold the owners on the overall value of the McQuay Rooftop VAV System with a Blow-Thru Coil and Optimal Discharge Air Temperature.



Optimal Air Systems trade a small amount of refrigerant efficiency for a large reduction of fan energy. Most air conditioning designs are based on supplying 55°F air to the space. This provides the required humidity ratio to maintain space conditions at 75°F and 50% Relative Humidity. Cooling supply air below 55°F offers the potential for significant capital savings in many applications. As the supply air temperature is reduced, the supply air volume is reduced proportionally. That is, a 10% increase in supply air delta T (Space setpoint minus the supply

air temperature) will result in a 10% drop in required supply air volume. This allows a reduction in duct and air handler face areas, and up to a 23% reduction in supply fan motor BHP.

The Optimal Air Balance Point is the lowest supply air temperature that can be used without increasing the annual operating cost of the building. While it is typically 48°F to 52°F, every building is different. Delta-T provided an annual energy analysis to DEC Engineers to determine the Optimal Air temperature for the new building.



Since the optimized air temperature was 52°F, the McQuay Systems did not require special engineering, materials or construction methods. In fact, their blow through configuration – which places the cooling coil after the fan and motor – was key to the success of the design because the supply air delta T in an Optimal Air System is based on the air temperature (LAT) leaving the unit, not the air temperature leaving the coil. Fan and motor heat adds at least 3°F. In a draw through configuration – which places the cooling coil before the fan and motor – this heat is added after the cooling coil. This would have required an excessively low coil LAT (49°F) – and much greater refrigeration efficiency penalties – to provide 52°F supply air to the space.

The Optimal Air System required much smaller ductwork because of the reduced air flow --which proved to be a big selling point with Paychex as the floor-to-floor height was limited by outside factors, and they wanted to keep their ceilings as high as possible.

In addition, the Optimal Air System required smaller shafts, which helped to increase leaseable square footage. As the smaller ductwork was easier to route, installing contractor Brian Cox Mechanical Contractors had more flexibility in locating the units. Location flexibility was also improved because smaller fans and fan



motors could be used, reducing the amount of sound attenuation measures required.

Smaller supply and return fans, fan motors and the addition of variable frequency drives all helped to lower equipment costs and reduce energy and operating costs. In short despite a higher cost per ton, the installed cost of the McQuay equipment was less per square foot than that of competing manufacturers.

Another benefit of the Optimal Air System and McQuay rooftop equipment is lower humidity in the occupied space. The result is exceptional comfort for the tenants and improved indoor air quality. In addition, the return fans used in the McQuay rooftop equipment provide more reliable control of building pressurization and help to reduce infiltration of untreated outside air. Finally the double wall

access doors on both sides of all the sections make it easier to service and maintain the McQuay rooftop system.

The lesson to be learned from Paychex is that “first-cost” decisions should not be based on cost per ton. Just as buildings are priced by the square foot, so too should their mechanical systems. With the added benefits of the Optimal Air System and McQuay rooftop units, Paychex was able to save close to \$1 per square foot in installed costs in addition to the value added benefits of their mechanical system.

Installed in September of 2001, the system is a big hit with everyone in the building – from the Paychex property managers to the new tenants. And everyone will continue to benefit from the cost savings that the system generates year after year.