

Rockhurst University: DOAS with enthalpy wheel

A TRICOIL dedicated outdoor air system for a new academic building in Kansas City, pairing an enthalpy recovery wheel with TRICOIL's recovered reheat.

Kansas City, MO

New academic building

11,000 cfm

Outdoor air, demand-controlled down to 6,000 cfm

\$149,100

Contract value, through U.S. Engineering Company

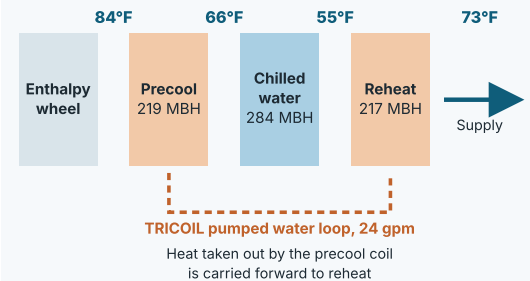
2014

Ordered June, delivered July 2014



The DOAS unit installed in the building's mechanical room, with the TRICOIL loop piping at right.

AIR PATH AT DESIGN



Design air temperatures and coil capacities from the TRICOIL submittal.

THE CHALLENGE

The building's dedicated outdoor air unit had to deliver up to 11,000 cfm of ventilation air to classrooms. A Kansas City summer brings hot, humid outdoor air, and drying that much air means cooling it to about 55°F, then warming it back up so the classrooms aren't cold. Done the conventional way, that reheat is a second energy purchase on top of the cooling. The same unit also had to handle Missouri winters without freezing its coils.

THE SOLUTION

Working with Kansas City mechanical contractor U.S. Engineering Company, Sensible Equipment Company supplied a custom Daikin air handler with TRICOIL, a pre-piped and pre-wired pump pack, and the control system with BACnet communication and start-up service. An enthalpy wheel first recovers energy from the 10,000 cfm exhaust stream. A TRICOIL precool coil and a reheat coil, tied together by a small pumped water loop, wrap around the chilled water coil, so heat taken from the incoming air is carried forward to reheat the dried air. Supply and exhaust airflow reset with room CO₂, between 6,000 and 11,000 cfm.

THE RESULT: ENERGY RECOVERED AT DESIGN

Summer · outdoor air 97°F DB / 76°F WB

Enthalpy wheel (exhaust air recovery)	25.7 tons cooling
TRICOIL precool coil	18.2 tons cooling
TRICOIL reheat, 55°F to 73°F, no new energy	63.7 kW heating

Chilled water coil load 23.7 tons, not 67.7

Winter · outdoor air -10°F

Enthalpy wheel, preheats -10°F air to 42°F	258 kW heating
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With the wheel and TRICOIL together, the chilled water plant sees 65% less cooling load at summer design, and the reheat needs no boiler or electric heat. Equivalent kW is the heat a resistance heater would have to supply. Capacities are from the 2014 equipment submittal (11,000 cfm supply, 10,000 cfm exhaust) at design conditions, not annual savings.

Why it carries over. Schools, training buildings, barracks and offices that need large volumes of ventilation air face the same problem in any humid summer. TRICOIL works alongside energy recovery wheels, in new air handlers and in retrofits.