

60 Miller Street Case Study — Renovation with Low Temperature VAV System

Overview

The 60 Miller Street project was a renovation of 12 story multi-tenanted office building in North Sydney, Australia. Each of the floors had approximately 12,800 sq. ft. of rentable area (172,200 sq. ft. total).

The sensible cooling loads in the building had increased dramatically from the original design. The loads increased 65% from 184 Mbh per floor (2,210 Mbh total) for an average of 13 Btuh/sq. ft. to 308 Mbh per floor (3,695 Mbh total) for an average of 24 Btuh/sq. ft.

The existing DX HVAC system with thermally-activated diffusers was not capable of delivering the higher cooling capacities or air quantities required.



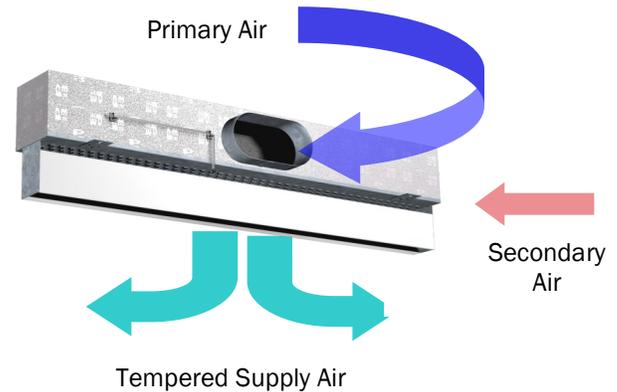
System Design Issues

- The installed DX packaged units were insufficient to provide the higher cooling capacities.
- The primary airflow was limited by the existing packaged DX units and ductwork, and an important design objective was to use as much of the existing ductwork as possible.
- The primary airflow circulation rate being provided by the existing system in the interior zones was relatively low at 0.45 CFM/sq. ft., and the new system should provide a supply air circulation rate of at least 0.8 CFM/sq. ft.

Design Solution

Dadanco was able to offer a low temperature VAV system design using Inffusers that met the design objectives.

- A single duct VAV system was selected for the interior and perimeter zones.
- The primary airflow remained the same, but the primary air temperature was reduced to 49 °F (26 °F Δ T) from the original 59 °F (16 °F Δ T) increasing the cooling capacities by about 65% .
- The existing DX package units were retrofitted with a water spray on the condenser coil to increase the refrigeration cooling capacities by lowering the condensing temperature/pressure.
- (1,583) linear 2-way discharge Inffusers™ and single duct VAV terminal units were installed in place of the existing thermally-activated diffusers. Secondary room air was induced into the Inffuser from the return air ceiling plenum and mixed with the cold primary air. The tempered mixed supply air was then delivered to the zones.
- Primary airflow in the center zones remained the same, but the induced secondary air had the effect of about doubling the total supply air delivered to the zones to 0.85 CFM/sq. ft.
- The supply air was delivered at a constant warmer temperature throughout the VAV terminals modulation range as the induction ratio remains constant alleviating any concerns about cold drafts or dumping.



Benefits

- Cooling capacities were increased 65% through the use of the colder primary air.
- Refrigeration capacity was increased with the addition of an evaporative cooling on the condenser coil.
- The primary airflow and fan power consumption was unchanged.
- The total supply air circulation rate was almost doubled in the interior zones.

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