

Project Name: 8 Brindabella Circuit – Canberra, A.C.T.

Overview:

3 story high quality office building located at Brindabella Business Park, Canberra International Airport with 4,040m² of lettable air conditioned office space, consisting of 1,780m² of perimeter and 2,260m² centre zones.

HVAC design required significant increase in energy efficiency to obtain the highest possible Green Building Council of Australia rating.

Solution must deliver best practice cooling capacity control and air distribution rates to comply with government tenancy requirements of minimum >5.0 L/s/m² air distribution rate while minimising primary air quantity, on-floor ductwork infrastructure and fan energy consumption.

Australia's First
Five Green Star Building ★★★★★



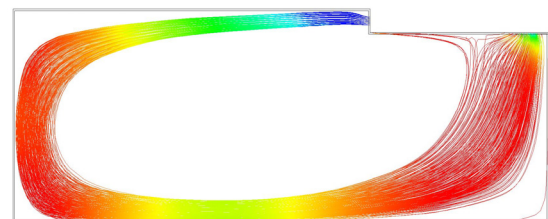
Image Courtesy of Canberra International Airport Group

Design Problems

- Conventional HVAC cooling & heating loads
- Sensible cooling capacity for base building of 264,613 watts
- 100% outside air ventilation requirement to exceed AS1668.2 by 50% or more
- Eliminate return air infrastructure (once through all outside air system)
- Minimize on-floor ductwork and infrastructure
- 21,815 L/s air quantity required to solve sensible cooling capacity with typical 14°C supply air
- Primary Air quantity (ventilation air quantity) limited to 5,751 L/s maximum available air for entire building
- Primary air temperature of 11°C required to deliver latent capacity with air quantity of 5,751 L/s
- 11°C air temperature to deliver required capacity would result in air diffusion problems (Cold Air Dumping)

Dadanco Solution

- Install 75 Dadanco bulkhead mounted HM30 perimeter Active Chilled Beam units throughout building perimeters
- Smaller primary air ductwork for perimeter units
- Install 84 Dadanco duct mounted HM40 High Induction Active Chilled Beam units throughout internal zones
- Smaller primary air ductwork for internal zones with Active Chilled Beams mounted direct to ductwork
- Install 13.5°C secondary chilled water circuit throughout building



Typical air characteristics of horizontal 'HM' unit

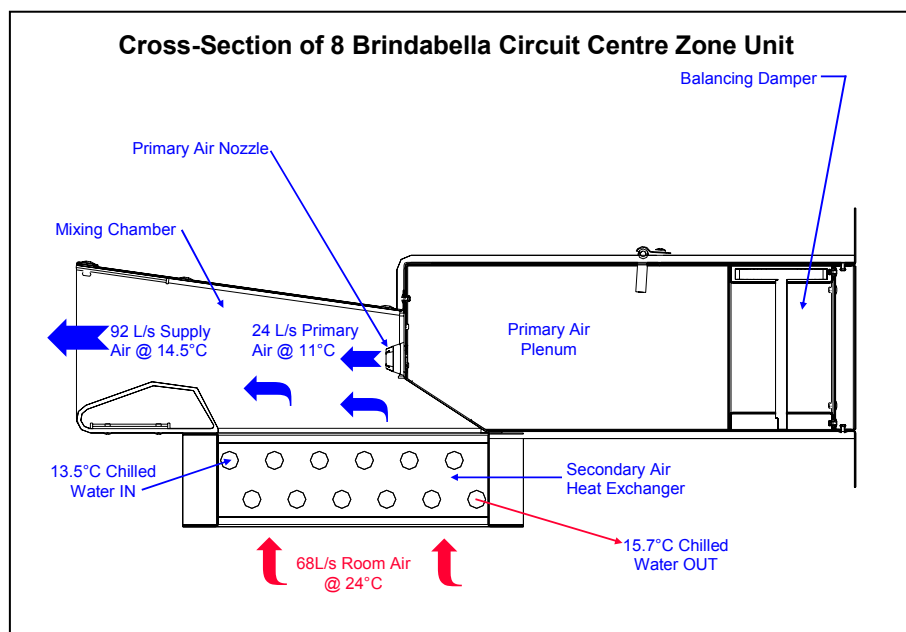


The design using Active Chilled Beam terminal units resulted in:

- New installed perimeter capacity of 153,017 watts using only 3,439 L/s of 11°C primary air and 8.27 L/s of 13.5°C secondary chilled water
- New installed internal zone capacity of 111,596 watts using only 2,301 L/s of 11°C primary air and 8.42 L/s of 13.5°C secondary chilled water
- Total primary air quantity of 5,751 L/s @ 11°C provides 10,031 watts latent cooling capacity and the required outside air ventilation quantity to satisfy design requirements
- 161,000 watts sensible cooling (61% of installed capacity) processed through secondary air cooling side of Active Chilled Beams delivered for **NO FAN POWER REQUIREMENT**
- 161,000 watts of sensible cooling through secondary air cooling side of Active Chilled Beams delivered using 16.7 L/s of 13.5°C secondary chilled water
- New total supply air quantity of 22,062 L/s delivered to entire building for only 5,751 L/s of primary air processed
- Delivered average air distribution rate of >5.5 L/s/m² for whole of building

Design & Performance Achievements at 8 Brindabella Circuit:

- Delivered total cooling capacity for lower total AHU air quantity than conventional designs
- Total base building air quantity reduced by 74% to 5,751 L/s (versus conventional all-air designs)
- Safely delivered 11°C primary air to all zones through the use of high induction Active Chilled Beams to increase total supply air quantity and improve supply air buoyancy
- Perimeter cooling capacity of 153,017 watts delivered for primary air quantity of 3,450 L/s
- Centre zones cooling capacity of 111,596 watts delivered for primary air quantity of 2,301 L/s
- Increased latent capacity performance by reducing primary air temperature without increasing air flow
- Delivered individual zone temperature controllability by allowing individual control of secondary chilled water in individual units or groups of units as required for tenant zoning
- 2-stage cooling process delivered 61% of total sensible capacity through secondary air and water for maximum load diversity benefit and comfort control
- Maintain maximum air distribution rate to occupied spaces regardless of cooling load profile
- Delivered required on-floor air distribution rate to all areas of the building
- Permitted the use of smaller primary air ductwork through reduced primary air quantity
- Allowed installation of smaller air handlers in the limited roof space plantroom



Other Key HVAC Design Features at 8 Brindabella Circuit:

- District cooling system for chillers and towers (shared with 3 other buildings)
- 'In-slab' secondary water cooling and heating system reduced sensible loads in perimeter zones
- Air heat recovery on waste air to reduce air handler loads
- Duct-mounted internal zone active chilled beam units
- 'Once through' 100% outside air ventilation primary air system (No return air infrastructure)
- Independent air handlers for internal zone and each building perimeter facade

NOTE: 8 Brindabella Circuit was completed in May, 2005.

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For more information on Dadanco Active Chilled Beams and other solutions delivery technologies, contact:

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