



All-Air System Upgrade to Active Chilled Beams & Centre Zone Infusers

Project Name:	70 Light Square, Adelaide, SA
Date Completed:	September, 2007
Building Size:	3,500 m ²
Designed By:	Bassett Consulting
Installed By:	Westside Mechanical
System Used:	ACB50 Perimeter IDS60e Centre Zones
Number of Units:	118 & 91
<u>Design Criteria:</u>	
Room Temperature:	24°C / 50%RH
Chilled Water Temp:	12°C
Primary Air Temperature:	12°C
Maximum Available Air:	2.330 l/s per floor

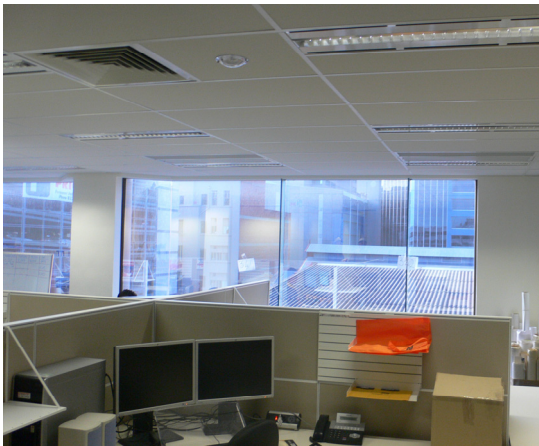
active chilled beam

Perimeter system

Refurbishment,

sustainability

+ flexibility



70 Light Square, a 5 story multi-tenancy Adelaide CBD office building with approximately 750m² nett lettable area per floor, required a significant increase in delivered sensible cooling capacity with necessary increases in air distribution rate to suit modern occupancies.

The design target was not achievable with the existing on-floor duct infrastructure and chilled water HVAC system which could not be enlarged due to tight ceiling spatial constraints and limitations on available plant space.

Solution must deliver best practice air quantities and increased cooling capacity using ductwork infrastructure no larger than the existing on-floor ductwork.

Infuser cold air solution



active chilled beam

Perimeter system

Infuser cold air solution

The Challenges

- Existing plantrooms and on-floor ductwork could not be changed or expanded
- Insufficient on-floor air distribution in centre zones
- Required increased sensible cooling capacity per typical floor to 67,000W
- On-Floor air quantity limited due to small plantrooms and tight ceiling spatial constraints
- New supply air temperature of 12°C required to solve centre zone capacity problem with limited air quantity of 1,525 L/s
- 2,000 L/s air quantity required to solve cooling problem with existing 15°C supply air
- Sufficient reduction in supply air temperature to solve capacity problems would result in air diffusion problems (Cold Air Dumping)
- New HVAC system must fit within tight spatial constraints

The Solution

- Retain & modify existing air ductwork for new air diffusion layout
- Install 118 High Induction ACB50 Active Chilled Beams units throughout the perimeter
- Install secondary chilled water infrastructure for perimeter Active Chilled Beams
- Install 91 IDS60e Inffusers throughout centre zones
- Reduce centre zone supply air (Primary Air) temperature from 15°C to 12°C to achieve sensible cooling capacity target
- Utilise Inffuser 'Induction' principle to increase on floor air distribution through localised entrainment of secondary air. 1 L/s of secondary air induced locally for every 1 L/s of primary air processed by the air handler
- Install smaller, higher capacity air handlers on each floor
- Install separate air handlers for perimeter zones and centre zone of each floor

The Benefits

- ✓ Delivered necessary increases in cooling capacity using smaller ductwork and air handlers
- ✓ Retained & re-used main branches of existing on-floor ductwork
- ✓ Increased air distribution rates to higher than 5.5 l/s/m² to all areas of the building
- ✓ New perimeter zone cooling capacity of 45kW delivered for only 806 L/s of primary air
- ✓ Delivered perimeter capacity control through secondary chilled water cooling process of Active Chilled Beam units
- ✓ Delivered 70% of perimeter sensible cooling capacity through the secondary cooling process of Active Chilled Beams for **NO ADDITIONAL FAN ENERGY REQUIREMENT**
- ✓ Delivered centre zone supply air temperatures of 17.4°C from 12°C primary air using the induction process to induce localised air for mixing with primary air
- ✓ New centre zone supply air quantity of 2,975 L/s delivered for only 1,525 L/s of primary air processed (Centre zone total supply air quantity increased by 97%)