



## Under-floor Inffuser System for Heritage Building

Project Name:	Main Hall, Perth Town Hall, Perth, W.A.
Date Completed:	December , 2004
Building Size:	268 m <sup>2</sup>
Designed By:	Bassett Consulting Engineers (W.A.)
Installed By:	Jako Services Ltd
System Used:	UFI Perimeter Under-Floor Inffusers
Number of Units:	51 (39.6 meters)

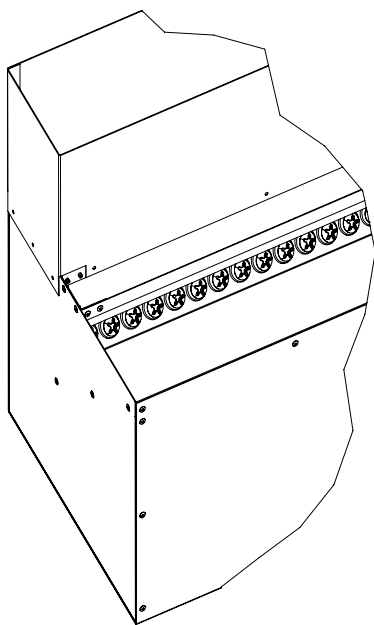
### Design Criteria:

Room Temperature:	24°C / 50%RH
Installed Sensible Capacity:	34.5 kW
Primary Air Temperature:	9.0°C
Maximum Available Air:	1,640 l/s Total

Heritage Refurbishment,

# sustainability

# + creativity



Isometric view of Inffuser nozzles  
and raised return air inlet

The Main Hall of Perth Town Hall, a circa 1870 heritage listed building, was restored to its former glory in 2004 as a civic space including air conditioning, ventilation and heating to suit modern comfort requirements for a facility hosting functions, exhibitions and public gatherings.

The design target was not achievable with conventional HVAC designs due to heritage limitations and restrictions on available under-floor space for plantrooms and ductwork.

Solution must deliver best practice air quantities and cooling capacity for occupancies of up to 380 people using non-traditional means with a creative and sympathetic engineering design to ensure all heritage constraints are met.

active chilled beam

Perimeter system

Inffuser cold air solution



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## The Challenges

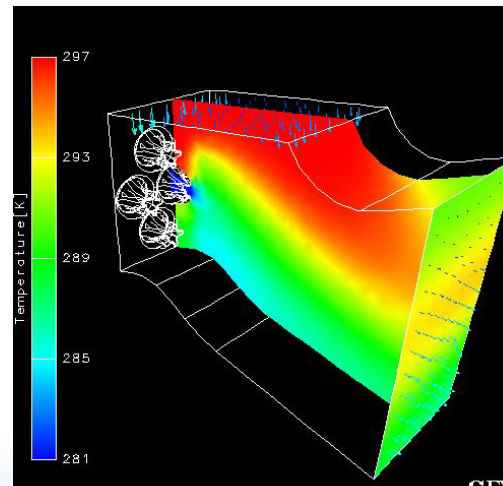
- Heritage listed building with no existing HVAC system or infrastructure
- Extreme limitations on available ductwork space and locations (under floor)
- Required cooling capacity of 34.5 kW sensible cooling
- Air quantity limited to 1,900 litres/second maximum
- 3,166 L/s air quantity required to solve cooling problem with nominal 15°C supply air
- New primary air temperature of 9°C required high entrainment rate of room secondary air to achieve final supply air temperature of 20°C for floor level delivery
- Sufficient reduction in supply air temperature to solve capacity problems would result in air diffusion and comfort problems if not reverted to at least 20°C
- Floor diffusers must be site measured for manufacture and installation between existing floor joists to solve heritage constraint fitment problems

## The Solution

- Design custom floor mounted Inffusers capable of entrainment ratios greater than 2:1
- Utilise Inffuser 'Induction' principle to increase on floor air distribution through localised entrainment of secondary air. Typically 2.1 L/s of secondary air induced locally for every 1 L/s of primary air processed by the air handler
- CFD design used to model Inffuser performance prior to final specification and manufacture

Image shows mixing of colder primary air with larger volumes of room secondary air to achieve final 20°C supply air temperature

- Site measure and construct individual Inffusers to fit between existing floor joists
- Install 51 High Induction 'UFI' under-floor Inffuser™ units throughout the hall
- Incorporate custom stomp-proof floor air grilles
- Design Primary Air temperature of 9.0°C to achieve sensible cooling capacity target while delivering supply air temperature to the space of 20°C or greater



## The Benefits

- ✓ Design concept proven prior to manufacture of Inffusers
- ✓ Under-Floor Inffusers site measured to fit between existing floor joists
- ✓ Satisfied heritage architectural considerations
- ✓ Delivered supply air temperatures of 20°C from 9.0°C primary air
- ✓ Delivered air distribution rates of higher than 4.5 L/s/m<sup>2</sup> to all areas of the hall