

Restoring an old classic

Refurbishing older public buildings with new air conditioning systems is a difficult task — a task that's made all the more difficult when the building is a historic, National Trust classified landmark. Carly Fordred discovers how engineers and installers managed to complete an overhaul of Box Hill Town Hall in Melbourne.



Box Hill Town Hall

Box Hill Town Hall is located in Melbourne's eastern suburbs in the City of Whitehorse. Built in 1934, the picturesque landmark today serves the community as a public building.

The hall was formerly the home of the City of Box Hill, but is now used for community and charity events, ceremonies, trade shows and seminars. The building houses two main function halls, rooms for hire, resident service centre and an art space that displays works from the city art collection.

Because of its heritage architecture, the project presented a number of challenges for the engineers and installers.

In recent years, the town hall has been recognised by the National Trust Building Register and has received Grade A classification in the city's heritage review.

In 2006, the hall underwent a \$6.5 million redevelopment, which included a refurbishment of three floors into custom designed offices, a new accredited art space, a pre-function area, booking area, sound panels in the main hall, repolished timber walls and floors, refurbished bathrooms, a new fire alarm system, rainwater tanks and a new electrical sub station.

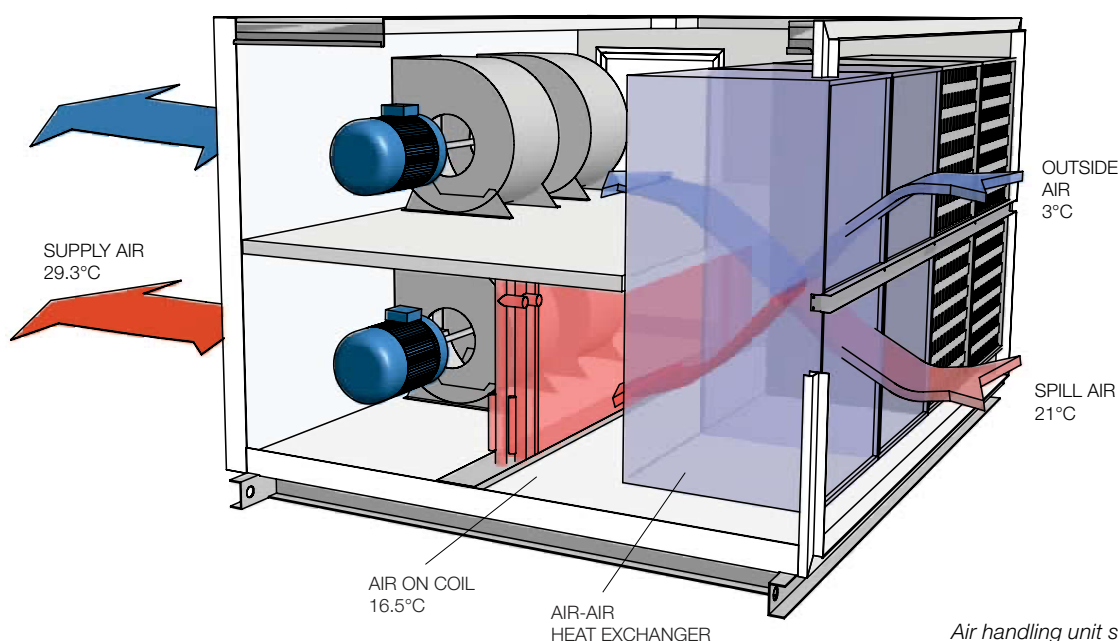
Fully air conditioned rooms and halls were also on the list.

Consulting engineering firm Irwinconsult and installation contractors OP Industries were charged with the task of overseeing the refurbishment. With such grand heritage, it was imperative that the new installation provided the building with the most efficient and sustainable system.

"The building was really worn out before the renovations and not utilised to its full capacity," says Keith Parsons of OP Industries. "There was a major need to make the office, main hall and other areas suitable for the staff and the public, hence the need to increase the ventilation levels. The Town Hall has various function rooms for hire including the main hall and several community groups occupy areas in the building, including the Box Hill Historical Society and even a community radio station, 94.1FM."

According to Will Northwood of Irwinconsult, the Town Hall refurbishment required complete replacement of mechanical systems in many areas.

The main hall, with occupancy of up to 500 people during functions, required a new heating system. The choice was an energy recovery air handling unit, supplied by Air Change.



Air handling unit schematic

“Due to constraints of the building construction and heritage considerations, we selected a 5,000 L/s full fresh air energy recovery air handling unit (AHU) with return air bypass, hot water coils and heat exchangers to serve the main hall. The hot water coil is connected to a central natural gas fired boiler plant,” says Northwood.

Although the hall has a maximum occupancy of 500, engineers needed to carefully consider the occupancy at non-peak times.

“Ten metre ceilings created problems to overcome”

“Adjustable outside air damper settings were provided to reduce outside air and hence the heating load at times of partial occupancy,” Northwood adds.

Air Change says that the inbuilt heat exchanger lies at the heart of the energy recovery air handling unit, and claims it reduces the cost of conditioning outside air by around 75%. Carbon dioxide sensors, a new addition to the AHU range, vary the requirement for conditioning and ventilation according to the number of people in the area. Variable speed drives which control fan speed come as standard on the unit and directly coupled fans and motors have replaced outdated pulleys and belts, reducing servicing costs.

Air Change engineering manager, Herman Chiu, explains the retrofit specifications.

“Design conditions provided were: outside air 3°C dry bulb, and return air 21°C dry bulb at 4,500 L/s outside air. Our selection program showed a saving of 51% or 78.2kW over conventional equipment without energy reclaim.”

“The air handling units have an inbuilt air-air heat exchanger which takes cool and dry outside air, then preheats it with hot spill air. As a result, there is a 13.5°C gain in temperature from 3°C to 16.5°C. This is where the major energy savings are made.”

“For improved energy efficiency a return air bypass system was incorporated to speed up the cooling or heating process by reducing outdoor air intake and increasing return air flow rate.

It also provides the operator a choice of maintaining temperature during extreme outdoor conditions,” Herman adds.

According to Parsons, the project also included the installation of 25 fan coil units, a chiller, two boilers, six pumps and the relocation of two evaporative coolers.

Because of its heritage architecture, the project presented a number of challenges for the engineers and installers.

Parsons says, “The work on Box Hill Town Hall was over a 10 month period. It was a difficult installation with many areas to do, and being a heritage listed building it presented issues of penetration and visibility.”

The building façade is especially precious, and was something that installers remained cautious of during renovations. In addition to its architectural preservation by heritage listing, the façade itself also has a colourful and somewhat controversial past.

The hall has white rendering over the external bricks, which is called ‘snowcrete’. At the time of the building’s grand opening in 1935, the ‘snowcrete’ created great controversy because many of the locals believed the external white façade was too imposing.

Consulting engineers were also challenged by the height of the building’s ceilings; however, they found a novel way of overcoming the issue of getting heat to the occupants down below in the hall.

“Ten metre ceilings created problems to overcome. We installed self adjusting swirl diffusers at ceiling level to direct the air in heating mode down to occupants in the meeting hall,” explains Northwood.

The retrofit was completed in March 2007, in time for the hall’s open day, where more than 1500 people came to explore the redevelopment.

While the majority of visitors wouldn’t have come to see the HVAC installation itself, most would have noticed the improvements to indoor conditions that the project has delivered to one of the city’s most treasured landmarks. ■