

A cool solution

Moving to a new office building is never easy but for China Shipping (UK) Agency and Johnson Stevens Agencies, one of the world's leading shipping companies, their recent move to a new UK head office which is a landmark building designed by London-based architects Colwyn Foulkes & Partners (CFP), presented quite a few challenges.

The 4,000m² HQ is located in the UK's busiest container port, Felixstowe and the design team was strongly influenced by the maritime history of the location. Pre-patinated copper for example forms the cladding on the rear elevations giving it a stunning 'sea' colour.

The L-shaped building comprises two wings of different sizes linked by a striking circular 'drum' on the corner of the L which contains the entrance foyer atrium, meeting rooms, directors' offices and boardrooms, and was designed to afford panoramic views of the area.

Standing four storeys high, the new building is considerably taller than anything in the vicinity and therefore there is no solar shading to be gained from nearby buildings. There is also very little shelter from the elements on what is the fairly exposed, North Sea facing site. A brise soleil solution consisting of both vertical and horizontal timber fins allows the buildings' occupants to enjoy views over the port whilst offering some protection from the elements, and reducing solar gain.

A chilled ceiling system from SAS International was specified as the cooling solution for the project and the new building also incorporates passive chilled beams at the building's

perimeter, to further offset the solar gain. The chilled ceilings feature on each floor, providing cooling to the open plan areas and management offices.

Key considerations

In today's environment, achieving good room comfort, reducing carbon emissions and energy usage and compliance with the amended building regulations are key considerations which is why chilled ceilings and beams are a good solution because they offer a proven and practical solution to all these issues.

Because of this, chilled ceilings and beams are emerging as an energy efficient alternative to traditional cooling methods in the UK. BSRIA has recently reported that their market grew by 33% in 2006, with an increase of 40% expected this year. Further rises in the value of the market are predicted to follow for 2008/09.

From below, chilled ceiling systems look visually the same as a suspended metal ceiling, but chilled ceiling panels house a cooling element in the rear of the ceiling tile. The 'coolth' is provided by means of radiation (as opposed to convection), which means there is no perceptible air movement. Occupants and surfaces benefit from the cooling in the first instance, which subsequently

leads to a reduction in the air temperature of the occupied space.

Passive chilled beams integrate heat transfer fins to the cooling element, enabling a large cooling/surface area in a relatively small space. They work using natural convection – as an occupied space's hot air rises, it is drawn into the chilled beam, where it is cooled. The air then returns downwards, reducing the air temperature and cooling its occupants.

Bespoke bulkheads were designed to house the chilled beams and the perforated surface ensures hot air generated from solar gain can climb and be cooled by the passive beam. Passive chilled beams can provide outputs in the region of 300 watts per linear metre, sufficient to offset the calculated solar gain.

Fresh air is normally supplied to chilled ceiling and beam systems by a displacement ventilation arrangement, which in China Shipping's case was installed at floor level. The combination of both systems provides space, which can accommodate future partitioning needs.

Water, as opposed to air or refrigerant, is used as the heat transfer method within the closed-circuit system. As water is pumped through the system, it absorbs and removes heat from an occupied space.



Low lifecycle costs

"The SAS chilled ceilings provided us with an ideal cooling solution" commented CFP architects. "In addition to their energy efficiency and sustainable qualities, they have a low maintenance cost over the system's entire lifecycle adding cost-effectiveness to their other attributes. By having the perimeter beams separate from the actual ceiling panels, the system is able to offset solar loads that many other cooling systems cannot handle due to lack of cooling output."

Another benefit of the system is its relative simplicity for this project. Connecting the chilled ceiling system proved straightforward and provided a great degree of flexibility when trying to install the system into a constrained building structure.

The chilled elements within the ceiling tiles containing luminaires were formed specifically to encompass the model chosen for the project. Apertures for these luminaires were factory formed and delivered directly to China Shipping. This meant on-site cutting of ceiling tiles was not required leading to a reduced installation time. Structural columns were also accommodated within the chilled ceiling and bulkheads surrounding the chilled beams.

The chilled ceiling panels at

China Shipping's headquarters are mounted on SAS International's 'flying arm' pivot system and integrate safety cables, which enable easy access to the ceiling void and associated building services.

Reduce energy usage

Water-based chilled ceilings and beams can help to reduce energy usage due to the system's comparatively high operating temperature of between 14°C and 17°C, as well as the ability to set up separate cooling zones, ensuring only occupied areas are cooled. The return temperature of the water is typically 2°C to 3°C higher than the flow temperature.

Along with reduced air flow, chilled ceilings and beams generate low noise levels again leading to a more comfortable,

and potentially productive, workplace. The lack of noise produced by the system and the low maintenance cost factors were also cited as important by China Shipping given the open plan nature of the workspace.

Chilled ceilings and beam systems also feature few moving parts, such as fans etc, which results in less energy needed to power the system. It also means that the workplace isn't disrupted by regular maintenance and service requirements and whole life costs are reduced. Chilled ceilings and beams can be combined with technologies such as free cooling and ground sourcing to increase their energy efficiency even further.

The project's M&E consultants were Charles D. Smith & Associates.

