

Chilled ceilings provide imaginative response to many challenges

From reducing the energy requirement for comfort cooling to overcoming the constraints of refurbishing buildings, chilled beams can provide imaginative solutions. **John Staunton** explains.

The 'Mitigation of climate change' volume of the Intergovernmental Panel on Climate Change (IPCC) 4th Assessment Report states, among its conclusions, that buildings offered the largest share of cost-effective opportunities for mitigating the effects of greenhouse gases (GHG) mitigation among all of the sectors it examined. Published in November 2007, it offers an important reminder for the start of 2008.

The IPCC Report highlights how current, commercially available and proven technologies in new and existing buildings could reduce greenhouse-gas emissions by as much as 70 to 80%.

This prospect is also pertinent given the amendments to Part L of the Building Regulations requiring a reduction in carbon-dioxide emissions. Similarly the Energy Performance of Buildings Directive has been a huge driver for change. Such regulatory and voluntary schemes are starting to drive significant impact in building design; an example is how cooling is provided in non-domestic environments.

Proven technologies

As the IPCC report indicates, there are available and proven technologies that can assist. Chilled ceilings and beams use water as a cooling medium to remove heat from a space as it flows through the system (for further details see article in *Modern Building Services* in August 2007, or go to our web site

"Chilled ceilings also allow lighting and other ceiling-mounted services to be integrated with factory-formed apertures without affecting the acoustic performance"

www.modbs.co.uk and put Staunton in the search field).

This type of system can help to reduce energy usage compared with other methods of comfort cooling by virtue of the system's comparatively high operating temperature of 14 to 17°C. It is also possible to set up separate cooling zones, ensuring only occupied areas are cooled.

Chilled ceiling systems work by cooling the entire ceiling, or at least a large part of it, to substantially reduce the mean radiant temperature so that people in the space feel cool, even with a high air temperature. The effect could be regarded as 'radiating cooling' to occupants, rather than directly cooling the room air. With the 'coolth' provided by radiation (as opposed to convection), there is no perceptible air movement and also no noise.

Similar in appearance from below to a standard metal ceiling system, a chilled-ceiling panel is constructed from a copper cooling

element which is bonded to the rear of a metal ceiling tile.

Tiles are usually square or rectangular, but can be made in a range of shapes and sizes to incorporate particular room or building's requirements.

Refurbishment

Bespoke dimensions were certainly needed for a non-standard grid of chilled ceiling panels at 75 St Stephen's Green in Dublin, formerly Colmstock House. SAS CoolCeil chilled ceilings were specified throughout the six floors of this prestigious new development in the heart of Dublin's business district. The requirement was for an energy-efficient system to be installed when compared to more traditional air-conditioning systems.

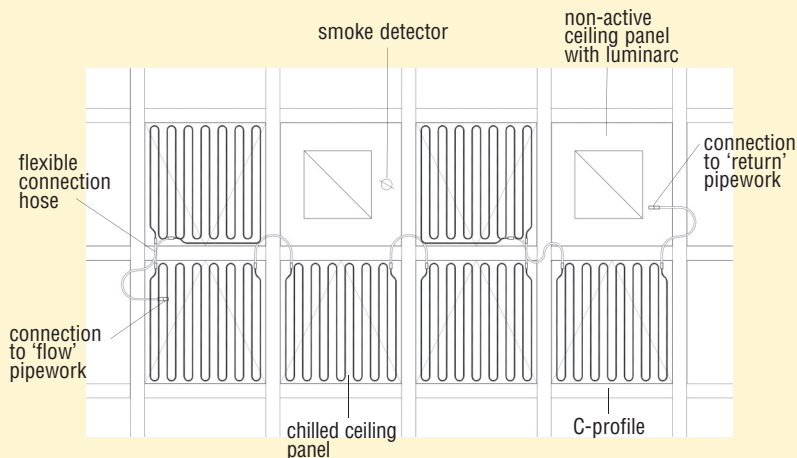
Further, the original building, extensively refurbished, needed a solution which took into account the low floor-to-ceiling height. The developers wanted to maximise the feeling of height within the space. An innovative cooling solution was required to allow a finished floor to ceiling height of 2700 mm, with only an 85 mm zone available below the coffered slab within which to install the chilled panels. SAS worked closely with the M&E engineers on the project to achieve this.

Chilled-ceiling systems can also incorporate acoustic absorption pads in the rear of the ceiling tile, and this was another benefit incorporated in the St Stephen's Green project.

As well as their energy efficient qualities, low maintenance costs over the system's entire



The ceiling designed for a major refurbishment project in Dublin combines cooling with other services such as lighting and smoke detectors into a zone just 85 mm deep.



lifecycle and its relative simplicity of installation were other advantages cited when a chilled ceiling system from SAS International was specified for the new UK headquarters of China Shipping Agency in Felixstowe, Suffolk.

This building incorporates passive chilled beams at the perimeter to offset solar gain, while the chilled ceiling provides cooling throughout the open plan areas and management offices.

By separating the perimeter beams from the ceiling panels, the system is able to offset solar loads that other cooling systems could not handle due to lack of cooling input.

These solutions, along with brise soleil to help keep the heat off the building in the first place, represent the way that fairly straightforward design changes can assist in the provision of more sustainable buildings.

Other services

Chilled ceilings also allow lighting and other ceiling-mounted services to be integrated with factory-formed apertures without affecting the acoustic performance. And with no need for the large ducting associated with traditional



Chilled ceilings and beams provide effective cooling for this new 4-storey head office of China Shipping (UK) Agency in Felixstowe. Chilled ceilings provide most of the cooling, with chilled beams around the perimeter to offset solar loads.



air conditioning in new buildings, overall construction costs can be significantly reduced. This also means that, for example, an increased number of storeys can be constructed without increasing the

building's overall height.

Finally, chilled ceiling and beams can be combined with technologies such as free cooling and ground sourcing to increase their energy efficiency even more by reducing the need for cooling to be provided mechanically

The design options can actually be increased by adopting such an approach, resulting in chilled ceilings and beams as a solution being given a high priority by end users and consulting engineers. BSRIA has

reported that the market for chilled ceilings and beams grew 33% in 2006, with a predicted increase of 40% for 2007 and further rises in the value of the market for this year and next.

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