

Cool runnings

Could chilled beams be the best solution for the long-term air conditioning of Middle East buildings? SAS International marketing director **Andrew Jackson** outlines the benefits of the technology and explains why it's growing in potential for the region.

Providing air conditioning in an environmentally friendly, cost-effective and aesthetically pleasing manner is a challenge faced by all building owners and developers worldwide. In the Middle East, where up to 80% of a building's energy use in summer months can be directly attributed to the air conditioning, selecting the most efficient system is even more important, particularly given the effect this can have on costs over the building life cycle.

The increasing demand for sustainable buildings in the region and greater focus on the whole life costs of a property are leading designers to consider the use of energy efficient and green technologies. And with the current financial crisis affecting all sectors within the construction and commercial property industries, finding ways to reduce running costs of both new build and existing buildings is now a top priority.

One of the latest technologies to be introduced in the region provides an holistic solution to all of these issues. With lower running costs and less maintenance needed than many traditional methods of air conditioning, chilled beams or ceilings offer a cost-effective system that can be applied to most building types.

The technology

There are two types of chilled beam technology available: active and passive. Active beams are the most suited to the Middle East environmental conditions. Although yet to be applied on a wide scale in the region, chilled beams and ceilings have now been specified for several projects and have been successfully installed and operated in other areas that have a similarly aggressive climate of high temperatures and humidity.

An active chilled beam is an air-water system that uses the energy conveyed by two fluid streams to achieve the required cooling or heating in a space. The higher the temperature differential between the air in the occupied space and the water flowing through a chilled beam, the greater the amount of cooling provided. This is particularly important during peak summertime months, when the temperature differential is greatest. Active chilled beams can provide up to 500W/m (150W/m²) of cooling capacity.

By combining an increased internal summer temperature with an energy efficient room comfort system such as chilled beams and ceilings, larger reductions in a building's running costs can be achieved. These reductions can lead to a drop in the size and cost of the central plant.

A report by the UK-based Wales School of Architecture, following two years of research and monitoring, found that the peak energy consumption of chilled ceiling systems is 70% lower than that of a traditional fan coil system.

Energy consumption is not the only advantage of chilled ceilings and beams. They contain no moving parts, such as fans and filters, which reduces the maintenance requirements and associated costs. This means they are more reliable and less noisy.

Integrated services

In terms of facilities management, one of the biggest advantages of chilled beams and ceilings is the potential to integrate several other services within the units. Termed Integrated Service Modules (ISM) or multi-service chilled beams can incorporate building services such as fire alarms and smoke detectors; sprinkler systems;



voice, data and power cabling; speakers and public address systems; and, importantly, lighting, all within an architecturally-designed metal casing.

The type of services that can be integrated is also likely to increase with advances in technology. For example, the recent refurbishment of Places for People's Headquarters in Central London marked the first UK project that combines active chilled beams with Micro Prism Optic (MPO) luminaire technology. The ISM for the project were designed and supplied by SAS International.

MPO technology minimises direct and reflected glare in conformity with both EN12464 and CIBSE LG7. In the Places for People project, the luminaires are linked to a DALI lighting system and a combination of passive infra-red absence detection and



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daylight sensors ensure lighting energy consumption is minimised.

Such integration reduces the ceiling space needed to provide the services; and simplifies the service routes, making them easier for facilities managers to trace in future; in addition, ISM are designed to enable maintenance of services through a single access panel.

The off-site prefabrication of building services within ISM also leads to faster on-site installation, a reduction in on-site wastage and storage requirements, plus a better quality end product, which will result in fewer problems during the life cycle.

Similar in appearance 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 manufactured in a range of shapes and sizes to incorporate particular room or client requirements.

User comfort

It is important that any energy or room comfort solution specified must still provide a high level of occupant comfort, resulting in an improved level of productivity. Although mechanical, the minimal level of refrigeration required in chilled beams, ceilings and ISM not only leads to less electricity being consumed, but also higher room comfort levels due to the minimal noise and air movement.

Cold dumping is not an issue as it can be with other air conditioning systems; instead the products offer high levels of uniform cooling. Chilled ceiling systems work by radiating energy (cooling) down-



Jackson: using chilled beams can cut operation costs.

wards which, in turn, cools occupants and contents within a space rather than directly cooling the room air. With the coolth provided by radiation rather than convection there is no perceptible air movement and no noise levels to contend with, which ensures another comfort factor.

In addition, it is possible to set up separate cooling zones within a room, ensuring only occupied areas are cooled and further reducing operating and maintenance costs.

The water flowing through chilled ceilings and beams does so virtually silently; the amount of noise generated by the air passing through the beams depends on the air flow rate, but again is minimal. The air passes through a series of nozzles before entering the active chilled beam.

Life cycle considerations

In an independent study by consultants Cyril Sweett the whole-life costs of chilled ceilings and beams, fan coil units, VRF and VAV systems were compared for a new three-storey office development operating over a 25-year period. The firm concluded that chilled beams and ceilings had the lowest life-cycle costs, being considerably cheaper to operate and maintain than the other technologies.

While not appropriate for every project there is no reason why this technology cannot be applied to most new and refurbished office developments, as well as within other environments such as schools, universities, airports, hospitals and libraries. **fmME**