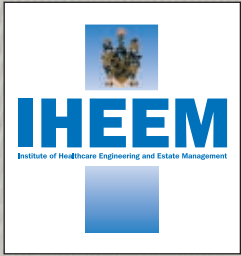


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SAS International product manager Andrew Jackson sets out the benefits of metal ceiling systems in modern hospital design.

With hospitals requiring seven times more services than office buildings, suspended ceiling systems offer the ideal solution, allowing mechanical and electrical services to be housed in the ceiling void. But with the design and aesthetic appearance of hospitals becoming increasingly important, alongside PFI requirements, what considerations need to be taken into account when specifying such ceilings?

Today there is increased understanding and evidence that hospital design impacts significantly on patient recovery, as well as staff wellbeing and retention.

In a recent CABE report 86% of nursing chiefs said that the design of hospital buildings improves the performance and morale of NHS nurses. Good light and air quality as well as a good acoustic environment are internal elements that have been identified as key, and the type of ceiling installed can have a significant impact.

The World Health Organisation recommends that continuous sound levels in patient rooms should not exceed 35 dB. However, several studies in the US and the UK have found that continuous background noise levels are commonly in the ranges of 65-80 dB. High levels of noise have been found to increase stress levels, reduce sleep quality and degrade speech intelligibility, thereby inhibiting patient recovery and reducing staff productivity levels.

When hard, sound-reflecting surfaces are used for ceilings this can reflect the noise, causing it to travel long distances creating nuisance where multiple reflections converge. The creation of such poor acoustic conditions can be alleviated by installing high performance sound-absorbing ceilings. While mineral fibre ceilings have often been promoted as offering the best acoustic control, metal ceilings can offer equally good acoustic control through the use of perforations and/or the inclusion of acoustic pads.

Metal ceilings

Metal ceilings also offer a more sophisticated look and are available in a variety of finishes which help enhance the perceived value of a building and perception of the internal environment by staff, patients and visitors alike. In addition, air movement between the ceiling void and the main space can generate unsightly staining at the interfaces of a mineral fibre ceiling. A quality metal product properly detailed will not suffer from this pattern staining or air movement defect. The finish on a ceiling

can also impact significantly on the diffusion of light around a space, for example a new low gloss finish that provides a plasterboard effect and diffuses light throughout a room without any unintentional light reflection from both internal and external sources.

Another key benefit of metal ceilings is their ease of cleaning, an incredibly important factor in the control of infection. Metal ceiling tiles, plain or perforated and backed with aluminium foil for sound absorption, act as a barrier to any filtering effect and render the tile a truly inert material. All that is required is simple washing.

Most non-metal ceiling systems are generally manufactured from porous, liquid absorbent materials with a form of paint sealant. At close examination, especially after the cutting of service perforations and accidental damage, product claims regarding cleaning characteristics are significantly affected and are not, from a ceiling point of view, comparable to a polyester-painted steel product.

In addition, recent advances mean that metal ceilings can now be provided with anti-bacterial coatings, applied during manufacture. Anti-bacterial coatings effectively inhibit the growth of microorganisms and control potential risk, when used in conjunction with routine cleaning procedures.

Finally, the most persuasive argument for specifying metal ceilings involves the exceptional life span and minimal maintenance costs. These factors are particularly important in PFI projects where the private companies will maintain the hospitals for periods of between 25-30 years before ownership passes to the NHS.

The life span of SAS metal ceilings in normal interior conditions is in excess of 25 years whereas the industry consensus



The long life span and minimal maintenance costs of metal ceilings makes them suitable for hospitals.

is that mineral fibre ceilings would be un-serviceable after only 10-15 years. In hospitals, maintenance of the many services requires the ceiling void to be regularly accessed resulting in high demands on the durability of the ceiling. Metal ceilings are polyester powder coated and are not susceptible to the paint chipping and accidental damage normally associated with mineral fibre panels. They also have a high level of scratch resistance and do not require re-decoration during their expected lifespan.

SAS in conjunction with a recognised quantity surveying practice has researched the overall costs of a metal ceiling throughout its expected lifecycle in relation to a mineral fibre one. The exercise was based on a 20 year period and concluded that a projected real cost saving of 47% is achievable.

Performance criteria

Within a hospital environment there are specific performance criteria that are of increased importance in different areas. While access to the ceiling void is important in all areas, accessibility is of prime importance in corridors as they house many of a hospital's mechanical and electrical services. The maintenance of these services requires the ceiling void here to be regularly accessed in numerous positions, resulting in high demands on the durability of the ceiling. Metal ceiling systems offer a range of different access options which allow ceiling tiles to be easily and frequently removed without damage.

A downward demountable solution with hinge and slide facility to maintain the tile within the ceiling plane is one of the most popular as the tiles are not physically removed from the supporting grid and are therefore less susceptible to damage.



Larger ceiling tiles are important in areas where high levels of hygiene are required.

Life cycle cost comparison

	SAS metal tile	Mineral fibre tile
Initial cost of ceiling tiles	£8.50/m ² (including grid)	£7.00/m ² (including grid)
Site wastage	2% (£0.11/m ²)	8% (£0.34/m ²)
Installation	£6.50/m ²	£6.50/m ²
General maintenance/replacement per annum	Nil	4%
Maintenance	Simple washing	Decoration
10 year refit costs		
Replacement tiles at current costs	Nil	£4.54/m ²
Removal and refit labour	Nil	100%
20 year refit costs		
Replacement tiles at current costs	Nil	£4.54/m ²
Removal and refit labour	Nil	100%
Residual value at end of lifespan (based on current values)	15%	Nil
Disposal costs – landfill	Nil	100%

The above comparison is based on a plain (unperforated) tegular lay-in metal tile and typical sand textured plane tegular mineral fibre tile.

The facility to slide the tiles along the grid allows the tiles to concertina together to allow access to large areas of the ceiling void. Alternatively plank systems with similar hinge down mechanisms, where the tiles are supported only on two edges are also popular, or a traditional plaster margin can be simulated by using plain tiles at the perimeter and full sized central access tiles. In other areas a lay-in tile with a tegular edge that is demountable using a "lift and tilt" method is generally sufficient.

Sound also has a tendency to reverberate down corridors and therefore acoustic control is of great importance here. Such acoustic control is achieved through the use of perforations and/or the inclusion of acoustic pads. However, as in wards, attention needs to be paid to the detailing of electrical and mechanical items incorporated into the ceiling plane as the acoustic performance of the ceiling can be compromised if care is not taken.

Acoustic separation between rooms is also a key concern, particularly within ward and accident and emergency areas. Traditionally such separation was achieved by the use of full height partitions. However, this does not offer cost-effective long-term flexibility, as to accommodate changes the reintroduction of wet trades are required in future refits. Today, flexible partition head fixing offers the ability to remove and relocate partitions without having to compromise acoustic performance and aesthetic appearance.

Within areas where high levels of hygiene and infection control are required, such as operating theatres, clean rooms and intensive care units, key points to be aware of include the use of larger tiles to decrease the number of joints and in some cases the use of non-perforated ceiling tiles.

Other specific environments include

dust free, MRI and X-ray rooms and humid environments. In dust free areas that require acoustic absorption encapsulated acoustic pads in cassette form with reinforced aluminium foil stop air movement through the tiles and ensure that during normal maintenance there is no release of particulate matter through handling. Within rooms that house MRI and X-ray machinery non-magnetic aluminium solutions coated with polyester powder coating should be used, and within humid environments the damaging nature of moisture can be combated by coating both sides of the ceiling, thereby satisfying the most stringent corrosion tests.

Case study: Evelina Children's Hospital

The new Evelina Children's Hospital in London has been designed around the needs of children, their families and staff. The finished building of 16,000 m² means that the project bypassed the normal NHS procurement process.

SAS contributed to the new design with a solution that, while meeting stringent standards such as acoustics and cleanability, also reflected the ethos of the client, patients, staff and design team.

In the 20-bed intensive care unit a linear plank system with large ceiling panels highlighted the size of the open plan space. Using large ceiling panels meant that scale was maximised and the number of joints minimised contributing to ease of cleaning.

In the larger circulation zones and corridors, clip in hinge down tiles improved accessibility to services and non-perforated metal tiles were used to improve ambient acoustics creating comfortable noise-free surroundings.

The design of the building reflects comfort and space, helping patients recover quickly.



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