



metal matters

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introducing metal matters

The **Metal Matters** journal will keep you informed about the latest developments in the use of metal in the construction of building envelopes. Traditionally, metal construction has been regarded merely as the envelope of industrial buildings. However, with the advent of modern technology, there has been an explosion in the creative use of metal in many other building sectors. Architects are no longer afraid to express their creativity through the use of steel. Designers have capitalised on steel's versatility on many high specification projects for example,

Cardiff's Millennium Stadium, the Sage Gateshead and Swiss Re in London.

The environmental and sustainable benefits of metal, together with developments in colour and form are now recognised by clients, designers and engineers alike and has led to a much wider use of metal in construction. **Metal Matters** will show you how to create imaginative and innovative building designs that offer cost-effective and sustainable solutions to benefit future generations.



flexibility in design

Futuristic Curves Shape Diamond

The Diamond Synchrotron is the largest scientific facility to be built in the United Kingdom for thirty years. This futuristic, doughnut-shaped building covers an area the size of five football pitches and has rapidly become one of the country's most striking and unusual landmarks.

One of the challenges faced by the design team was to achieve the complex geometries of the roof structure whilst maintaining a consistent U-value across the entire roof construction. The design flexibility offered by metal was the ideal solution and some 35,000 square metres of natural curved, pre-curved and curved tapered Kalzip aluminium sheets were supplied by MCRMA member company, Corus Building Systems. The architects, in conjunction with the Kalzip technical team, were able to develop a series of value engineered system configurations

that were precisely tailored to meet the complex and rigorous requirements of the specification.

MCRMA associate members Ejot UK and Latchways plc also played their part in the building's construction. Ejot's fasteners were specified for fixing the Kalzip clips. The fasteners are manufactured from stainless steel, with welded carbon steel drill point and leading threads and this enables effective drilling and tapping at high speed to provide maximum performance.

Safe working at heights is paramount and for this project Kalzip designed and developed the Kalzip fall arrest system in conjunction with Latchways. The system is able to support up to three people at once and proved to be a valuable and effective tool in ensuring safety levels throughout the construction of this complex roof structure.

Photo courtesy of Diamond Light Source Ltd.



Architectural Flashings Take Off



Architectural flashings and fabrications are defined by the fact that they are used on buildings deliberately for their visual effect, in addition to any weatherproofing function they may have.

The new terminal building at Guernsey Airport is a perfect example of how architectural flashings can provide a striking visual effect. MCRMA member company, Ash & Lacy supplied a number of products from their range of architectural fabrications in the creation of this high-tech front entrance to the new terminal, which is designed to handle 1.25 million passengers a year. Feature canopies at the arrivals and departures entrances/exits to the terminal are finished using Ashfab fabrications, all in a metallic silver powder coating to complement the building's aluminium cladding and glazed frontage.

Architectural flashings range in sophistication from two-dimensional bent pre-coated steel flashings to post polyester powder coated welded aluminium complex fabrications.

Attention to detail at the design stage is essential as an inappropriate choice of material or manufacturing method can lead to the installed product being both a prominent 'eyesore' and a permanent poor reflection on the complete building.

Considerable expertise is required to ensure that architectural flashings and fabrications will be compatible with the cladding systems on the building and provide reliable long-term performance. MCRMA member companies either possess that expertise in-house or are able to recommend reliable supplier companies.

case study

A Sound Result For New School

The acoustic performance of a building is an important aspect of the overall design and the roof construction can play a major role in building performance. As well as being potentially harmful, noise is now seen as an important constituent of environmental pollution and there is a need for noise control to ensure that people are neither harmed nor annoyed by noise. A school environment certainly makes demands on its acoustic performance; a test which the new 1,000 place Bishop's Park School in Clacton passed with distinction.

The school's layout is based around three distinct wings to create a 'school within a school' environment and internally the school is organised around a well-lit atrium. The roof concept therefore required good sound absorption and good sound insulation; two facets that are usually at odds in designs and, coupled to this, the specification called for a flat pre-painted soffit.

The solution was a triple skin metal construction including a perforated soffit, acoustic insulation, a profiled steel liner, non combustible insulation and an aluminium SpeedDeck secret fix external profile.

The vapour control layer and air barrier were formed by the intermediate metal skin which supported the spacer system and main insulation.

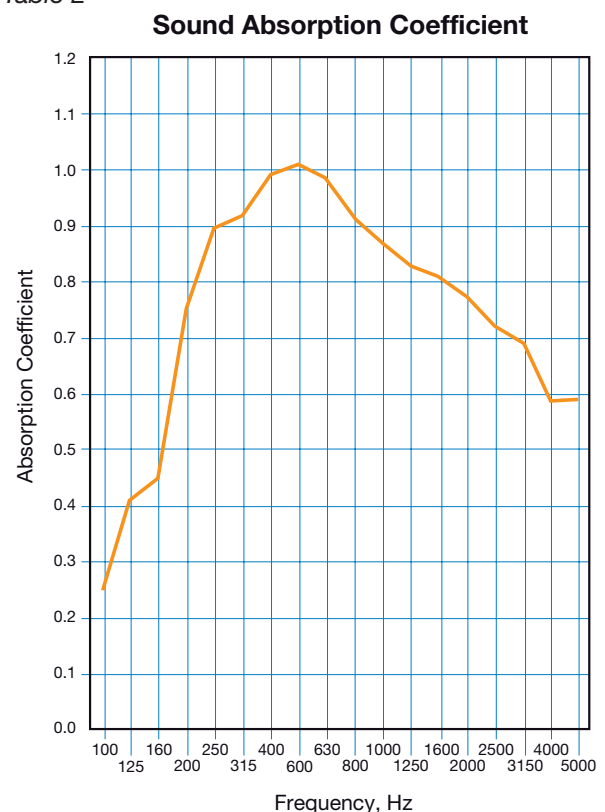
In acoustic terms, the perforated liner was regarded as transparent to sound and so the design team was satisfied that the sound insulation performance would be similar to, but no worse than, the twin skin system previously tested by SpeedDeck (refer to table 1). $R_w = 46\text{dB}$ is an excellent value and compares typically with 27dB for rigid PIR composite panels.

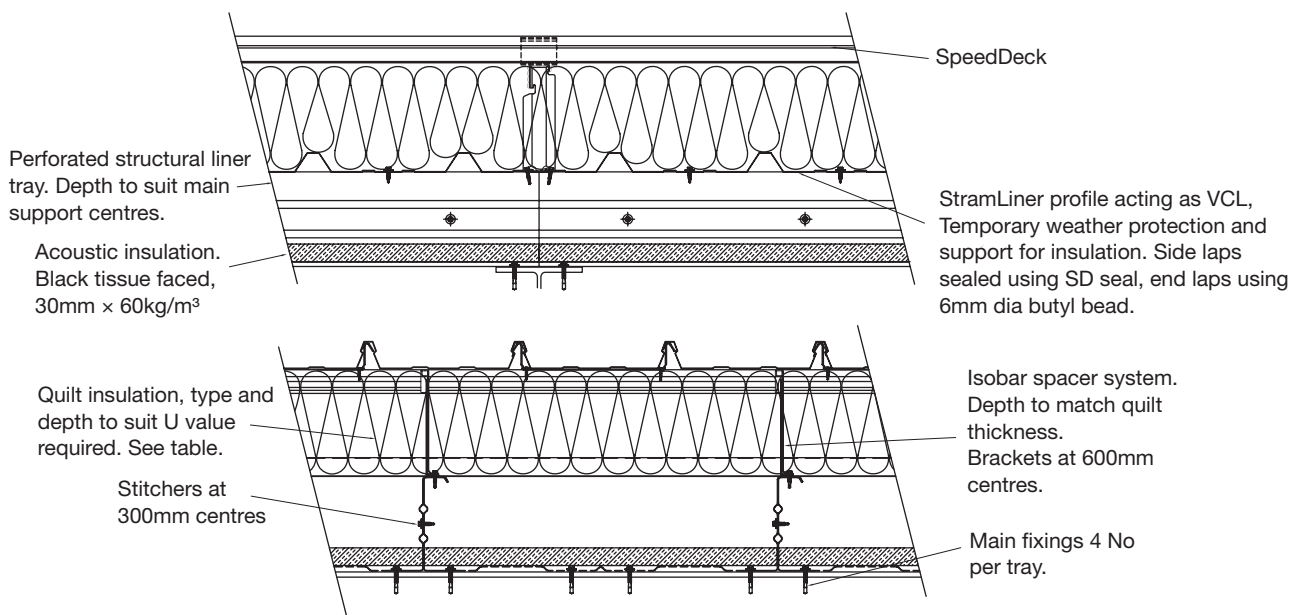
Table 1

Construction	0.9mm Aluminium SpeedDeck 180mm glass quilt insulation 180mm IsoBar spacer 0.7mm steel 32mm deep Walkliner
Sound Insulation	$R_w = 46\text{dB}$

The sound absorption properties were tested using the actual assembly used for the school projects and the performance is shown in table 2. The large perforated area in the flat soffit gives the tray a performance similar to pan perforated Walkliner and much better than profiles reliant on perforations in the web.

Table 2





Other tests carried out for the project included the strength of the fixings chosen to suspend services from the trays.

While three skins of metal seem a little 'over the top' it is worth noting the following features:-

- All the roof components are easily re-cycled without landfill or the release of hazardous materials or gases
- The roof assembly met all of the thermal and acoustic design values.
- The air barrier/vapour control layer was a profiled metal component and more robust than taped membranes.
- The soffits were pre-decorated.
- The flat soffits gave a clean appearance to the internal spaces.
- All components are non-combustible.
- The project illustrates the superb flexibility in design offered by metal roofing.

Photo courtesy of Wates Construction Ltd

metal is future-proof

The concept of sustainability is no longer the preserve of the eco-warrior; sustainable development is now part of mainstream government and industry thinking with policies in place to match.

Construction has an important part to play in delivering sustainable development because of both its contribution to the economy (8% of GDP), and the significant environmental and social impacts that buildings and other structures can have. Construction and the built environment are fundamental to the health and well-being of society; consequently they have been particularly highlighted as sectors where government and legislators aim to achieve significant improvements. Sustainable construction is about achieving a viable balance between economic competitiveness, social benefit and environmental impact.

When specifying, designers should consider the range of materials and structural systems available and select those that allow flexibility and adaptability to meet future changes to the building function and also to facilitate the re-use and recycling of materials at their end of life.



More than 90% of steel from construction is recovered for recycling or for re-use.

Metal cladding systems have good sustainability credentials as a result of their recyclability at the end of life. Although metal sheeting systems are not routinely re-used, the material itself can be processed and recycled for other applications. Similarly, the materials used for the manufacture of the metallic components can contain some recycled material. Both of these factors reduce the environmental impact of metal cladding systems.

The steel construction sector's sustainable development strategy has been developed by Corus, SCI and BCSA, in consultation with all parts of the sector. The MCRMA has contributed to the development of the strategy, subscribes to its goals and is supporting its implementation.

Steel framing and cladding systems provide scope to design buildings with low environmental impact



on the right track

Britain's Olympic cycling hopefuls have the perfect venue in which to train for the 2012 London Games at the Wales National Velodrome in Newport. One of only two of its kind in the United Kingdom, the velodrome houses a 250 metre indoor cycling track, sports science and fitness rooms plus seating for up to 500 spectators.

Euroclad's roof and wall cladding, together with steel components have been used to achieve a finished design that externally reflects the curved geometry of the velodrome's race track without compromising the weatherability or the design life of the structure. The trapezoidal profiled sections in 10 metre lengths ready for the cladding contractor to install directly onto Ash Grid bars fixed along the line of the roof. These one metre wide top sheets were then craned up on to the edge of the lower level and fixed into position.



The required thermal performance for the roof, which also incorporates triple-walled transparent sheets in the same form and plane as the metal profiles, was achieved by the inclusion of 180mm of mineral wool insulation in the space above the liner panels. Drainage for the vast roof area is by means of a galvanised valley gutter running around the edge of the roof and discharging down the outside of the building in colour-coated aluminium downpipes.

An additional 4,000 square metres of trapezoidal profile sheet was used as a built-up system in conjunction with liner panels and mineral wool insulation to clad large sections of the elevation.

MCRMA membership

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Architectural Profiles Limited
Ash & Lacy Building Systems Limited
C A Group Limited
Corus Building Systems, Kalzip Division
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Rockwool Limited
Roof Fix Supplies Limited
SFS Intec
Structural Metal Decks Limited
Tegral Metal Forming

Floor/deck group

Corus Panels & Profiles
Kingspan Metl-Con Limited
Richard Lees Steel Decking Limited
Structural Metal Decks Limited
Tegral Metal Forming

The Role of MCRMA

MCRMA represents the major manufacturers in the metal roofing and cladding industry and seeks to foster and develop a better understanding amongst specifiers and end users alike of the most effective use of metal building products, components and systems.

From its inception, MCRMA has been a voice for the industry and works closely with a variety of industry bodies and standards committees to ensure that best practice is followed at all times. Such activities have included work with the BRE to assess the risk of climate change for roofing, and consultation work in preparation for the latest revisions to the Part L Building Regulations. In addition, MCRMA has contributed to the development of the steel construction sector's sustainable development strategy.

The Association's campaign for improved technical knowledge of metal building construction within the industry is borne out with its well established and authoritative technical design guides which are all freely available on the MCRMA web site to ensure the widest dissemination of good practice.

MCRMA membership comprises three categories. Firstly, full members who produce the majority of the metal roof and wall cladding manufactured in the United Kingdom. Secondly, associate members who comprise the manufacturers of the components that are used in metal roof wall and cladding systems. More recently, a floor/deck group has been established to reflect the increasing popularity of composite construction using steel decking, particularly in the commercial sector.

Makeover for Web Site

The MCRMA web site has been given a makeover and has some interesting new features. A major innovation is the availability of the construction details in a 3D interactive version. Details are shown for both composite panels and built-up systems which can be downloaded in both CAD and pdf file formats.

The MCRMA technical design guides, together with supplementary articles and bulletins on a variety of topics and issues, are available for download – so whatever your question, you're sure to find the answer in our publications.



In addition, the web site contains profiles of all MCRMA member companies, including floor/deck members who can all be contacted at the click of a mouse.

Visit the new look web site for the definitive guidance to all aspects of metal roof, wall and floor/deck constructions.

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Whilst the information contained in this design guide is believed to be correct at the time of going to press, the Metal Cladding and Roofing Manufacturers Association Limited and its member companies cannot be held responsible for any errors or inaccuracies and, in particular, the specification for any application must be checked with the individual manufacturer concerned for a given installation.

The diagrams of typical constructions in this publication are illustrative only.