metal matters

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shelter in style

This inspirational use of metal has led to the creation of a spectacular new bus station in the city of Norwich providing over 2000 square metres of shelter for passengers.

The building's roof comprises two profiled aluminium canopy sections forming a pointed ellipsoid shape along the site with translucent PVC roofing over the gap between the two sections and over the central lightwell. Kalzip stucco-embossed aluminium standing seam sheeting provided the flexibility and robustness to accommodate the unusual shape with a stunningly attractive effect. The coated bullnose feature around the perimeter of the roof canopy contrasts with the white profiled metal soffit, adding the finishing touches to an impressive building.

The aluminium profile for the complex tapered sections and curves is complemented by the specification of SFS intec austenitic stainless steel and carbon steel fasteners for the roof sections and lightwell cladding. The SFS intec austenitic stainless steel fasteners include irius® self-coloured and self drilling fasteners and SDK3 fasteners designed to eliminate over tightening of profiled aluminium sheeting, with SD3 fasteners for internal liner sheet fastening.

The Norwich Bus Station is set amongst office developments at the southern edge of the city centre and is part of a £5 million investment to improve the public transport network.

Client: **Norfolk County Council** *Architects and engineers:* **NPS Property Consultants Ltd**
Main contractor: **Bluestone plc** *Roofing and cladding contractor:* **WWR (UK) Ltd** *Photographer:* **Keith Whitmore**

it's child's play for composite panels

When Cumbrian-based Twoey Toys decided to commission new premises in Wigton to consolidate all the company's operations on one site, it presented an ideal opportunity to specify a design that would minimise the environmental impact of the firm's operations. The building designed by Alpha Design of Cockermouth comprises a 1,200 square metre steel frame building with a two-storey office block at the front and a large production facility and shipping area at the rear.

The design required 80mm thick panels for the roof and 60mm thick panels for the walls and the specification of Steadmans AS35 insulated panel cladding system has helped in the delivery of an energy efficient, durable building. The panels consist of two coated steel profiles bonded to a core of PIR insulation; they can be used to form roofs down to 4º pitch and walls. The panels are available in lengths up to 12 metres, giving rapid coverage on site.

The PIR core which has zero ozone depletion potential has a very low thermal conductivity, allowing designers to specify high levels of thermal performance without requiring excessively thick panels. The large size of the AS35 panel minimises the length of joints, helping to minimise air leakage and the associated heat loss.

As part of the compliance process for Part L of the Building Regulations the building was tested for airtightness by Stroma Technology Ltd. The result of $5.07m^3/m^2$/hour @ 50 Pa was well within the required standard of $10m^3/m^2$/hour @ 50 Pa.

In addition to installing energy-efficient composite panels, the building also includes a heating system which uses waste wood from production which not only reduces heating bills but also saves over £5,000 a year on waste collection.

exploring new dimensions in roofing design

Specifying metal roofing systems requires an understanding, not only of the inherent building regulations that must be adhered to, but also of the U-values, wind load and condensation risks associated with different products and systems according to their application. David Lowe, Technical Director of SpeedDeck Building Systems explores the electronic approach to specifying roofing products.

A task that was previously time consuming and laborious has been transformed with the help of a new form of engaging software that is designed for use by non-engineers. Designer 4 has been created using Eleco Software technology for use when specifying SpeedDeck products.

With visualisation and interactive pages, a few simple clicks enable the architect to select from a range of SpeedDeck materials and then make an estimate of roof wind loads that are specific to both the location of the building project and also the size and form of the structure. From here the user has the ability to check loads, spans and condensation risks, as well as obtaining weights and construction depths, finally creating a complete and comprehensive draft specification that can be incorporated into tender documents.

Flexibility in the use of such technology is a prime concern. Recognising this issue, Designer 4 also incorporates a gutter design module which takes the practical issues out of calculating the length and type of drainage systems required including gutter, outlet and pipe sizing, which all use location and application-specific data.

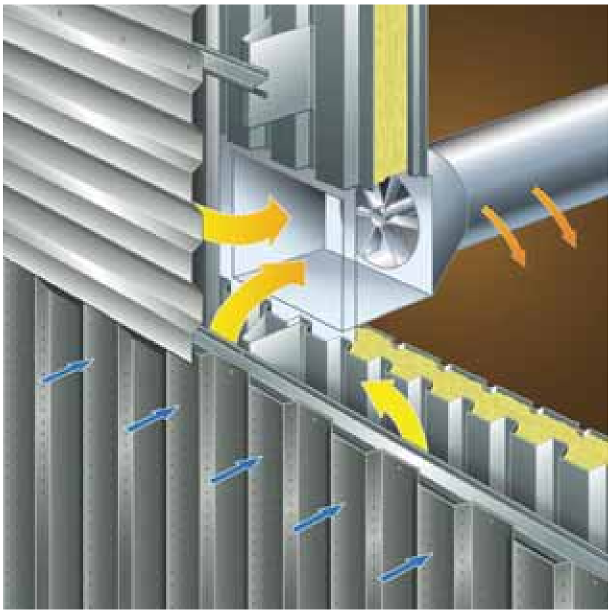
The ability to see and visualise a final scheme is clearly vital. Using state of the art “Objects to See” three dimensional technology (o2c 3D), Designer 4 enables the user to study construction details ‘in the round’, with the option of a 360º view, both inside and outside the detail. By reducing the time taken to make initial calculations and create a bespoke roof system specification, this element of building design can be tackled at an early stage, ensuring that the performance of the entire structure is not compromised at a later stage.

Simplifying the specification process enables the architect to redress the time balance, committing more resource to the creative process itself. By using software from a reliable partner, comprehensive designs with fully formulated measurements and costs can be achieved with just a few clicks.

the changing face of renewable technologies

The subject of renewable energy technologies is an exciting one because everyone has an opinion on it. Everyone knows that they have to make environmentally positive contributions to the target of CO_2 reductions and that they are therefore now a critical part of the construction process. Indeed, many planners are insisting that new construction projects include provision for a minimum of 10 percent of a building's energy requirements to be obtained through renewable energy technologies.

However, with an ever-expanding portfolio of these technologies to choose from including photovoltaics and wind turbines and all offering varying degrees of energy efficiency, there is a growing need for clients to understand which technology is most suited to their project. Developers are driven by profit and, whilst the more enlightened amongst them are keenly aware of, and committed to, environmentally responsible construction, they can not lose sight of the necessity to return a payback on their outlay. In short, the question is whether they are making an investment or simply adding cost to their project to pay lip service to environmental concerns.



One of the most exciting developments in renewable technology is SolarWall™ the transpired solar collector system (see illustration, bottom left). Although this technology is not yet commonplace, it is a simple concept which is tailor-made for industrial, commercial and distribution buildings and has been used on a wide variety of projects globally since the mid-1970s.

SolarWall™ is a metal solar cladding system available from CA Group. The system is installed on the southerly elevations of a building and consists of a metal external skin, utilising 2,500 tiny perforations per square metre, mounted on a spacer system to create a cavity. Solar radiation heats the metal skin, and an internally mounted fan creates a negative pressure within the cavity. This draws external fresh air through the perforations at a controlled rate. The air is heated by as much as 30ºC over and above the ambient temperature as it passes through the sun-warmed metal skin.

Once inside the cavity, the now-heated air rises to the top of the building, where it is piped into the building through a conventional or fabric ducting system to support, or even replace, the existing heating system.

In the hotter months of the year, transpired solar collectors help to reduce the cooling load of a building too. Because they are installed on the elevations that are subject to the most solar radiation, they effectively shade the building from the direct heat gain which would normally transfer into the internal environment.

A 410 square metre SolarWall™ metal solar cladding system was installed on to the south eastern elevation of the profiles mill building at CA Group's headquarters. (Top)

Heated air is collected within the SolarWall™ cavity from where it is delivered into the building via 60 metres of fabric ductwork. (Above)

The unwanted heat is then vented to the atmosphere at the top of the elevation, while vents can be opened to draw in cooler external air from roof level. The only moving part in the system is a simple electric fan, which can be powered by a small photovoltaic cell, and the fact that the collector is made from metal means complete recyclability at the end of its projected 25 year service life.

CA Group installed a SolarWall™ demonstration unit as a retro-fit on their own profiles mill building at their headquarters in Evenwood, County Durham in March 2006, since when they have recorded impressive reductions in CO_2 emissions and heating bills. The installation is being monitored by BSRIA (Building Services Research and Information Association) and an interim report on its performance in the UK shows a heating saving of over 50% for the initial three month period of the study. This system will pay back its embodied energy within the first year of operation and on new-build developments will pay back its capital cost in three years.

Finally this technology allows developers to produce 'solar ready' speculative buildings to suit the requirements of individual tenants. The perforated cladding and the cavity can be installed during the construction of the building proper and the heating and ventilation system can be connected as a routine part of fitting-out prior to occupation. From day one, the tenant saves on heating bills, while the building owner achieves a higher than normal asset rating and could also own the right to trade the saved CO_2.

advantage aluminium

The benefits of aluminium as a construction material, from its durability and strength to its flexible design potential and ability to be fully recycled have long been recognised but, as the need for sustainable construction materials rises, the environmental advantages of aluminium are also becoming increasingly significant in the specifying process.

Aluminium is the most abundant metallic element on earth, making up approximately 8% of the earth's crust. Indeed, of all the elements, aluminium ranks a proud third behind oxygen and silicon as the most commonly occurring. At the present rate of usage at least 300 years supply has already been identified. Whilst the method of isolating aluminium from ore consumes a large amount of electricity, two-thirds of this processing now uses electricity generated without CO_2 emissions - hydroelectric power.

Kalzip aluminium sheets can be recycled using just 5 percent of the original energy used, with no loss of quality or volume. When the building reaches the end of its life, the sheets can be dismantled and either recycled or reused, rather than discharged to a landfill site.

Kalzip has also developed an innovative range of sustainable solutions including the Kalzip Nature Roof; an advanced green roofing system developed to provide numerous environmental benefits. By helping to reduce carbon emissions and providing improved levels of oxygen, the Kalzip Nature Roof brings significant benefits to the surrounding microclimate. The plant leaves also help to absorb air borne pollutants such as traffic fumes and dust.

Kalzip Nature Roof can also improve the thermal performance of a building by providing protection against heat loss in the winter and heat gain in the summer. The retention of rainwater, which studies have put at nearly 73%, also enables the Nature Roof to provide an improved acoustic performance that can assist in meeting the requirements of Approved Document E in regulating 'resistance to the passage of sound'

eurobond fits the bill at asda

Planning demands, build time and cost were all key to the specification of Eurobond's Rockspan panels at the new Asda store in Hereford.

Designed by HGP Architects, the store development includes a health centre and community centre and the relocation of the local bowling club. The 75,400 square feet store is based around a 13.5m high glazed glass rotunda entrance with large glazed cantilevered entrance canopy and high level brise soleil. The elevations are constructed from a mixture of Rockspan cladding, brick, reconstructed stone and white through-coat rendered panels. Manufactured from a non-combustible mineral wool core, the panels will also limit flame spread in the event of a fire.

As Asda's 'model' cladding panel for its ability to span long distances without the need for sheeting rails, Rockspan offered particular benefits for this installation in terms of cost savings. Additionally, the speed at which the system can be erected was also vital as it provided a watertight structure earlier than would normally be possible, allowing internal trades to commence sooner. Other external dressings such as stone and brick facings were then bolted on – taking them off the time critical path. Using a high density, non-combustible Rockwool Conrock core, the system offers symmetrical fire protection of up to two hours integrity, without the need for additional flashings to either the inside or outside which reduces the construction time and ensures that a smooth, flat finish is not compromised.

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update

Guide to Successful Fabrications Design

The revised MCRMA technical paper No 11 *Metal fabrications: design, detailing and installation guide* is now available. The guide sets out the basic principles behind the successful design, detailing and installation of fabrications in profiled metal roofs and walls and examines all aspects of steel and aluminium fabrications and workmanship, together with special applications such as GRP soakers or on-site welding.

New Guide Adds Value

The introduction of more highly insulated structures to meet the need to save energy has led to a requirement for more sophisticated methods for calculating the heat loss and surface temperatures in buildings than was previously felt to be adequate.

Technical paper No 18, *Conventions for calculating U values, f-values and Ψ-values for metal cladding systems using two- and three-dimensional thermal calculations*, illustrates the procedures to be used in calculating Ψ and f-values and typical values for a range of both twin skin and composite constructions as recommended on the MCRMA web site.

Web Wise

Keep in touch with the latest developments in metal cladding by visiting the MCRMA web site. In addition to the 3D interactive construction details, the web site is regularly updated with MCRMA's latest technical publications.

New additions to the web site include the revised technical papers Nos 11 and 18. In the publications section of the web site, you will also find a report which demonstrates the stability of spacer bars and an updated guide to manufacturing tolerances for profiled metal roof and wall cladding. And for readers who missed the first issue of Metal Matters – this is now available online.

Visit **www.mcrma.co.uk** for the definitive guidance to all aspects of metal cladding construction.

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