On trend
What's making waves in tiling
08

Roofing
Kaohsiung Centre for the Arts, Taiwan
14

Special report
Insulation joins the sustainable revolution
26

Doors & windows
Bayes Centre, University of Edinburgh
28

Interiors
V&A Photography Centre, London
38
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...PIP, like RIBAJ, has undergone a cosmetic makeover to see in 2019. Except, unlike RIBAJ, which decided to go large with its “J”, PIP’s decided, naturally, to do the exact opposite and go small. Hence the lower case ‘i’, which characterises PIP’s identity, with a logo that’s now free to roam the cover like a wildebeest across the plains. Among all the familiar content in this issue, you’ll also find a new section, ‘On trend’, that quizzes specifiers, manufacturers and suppliers about how where they see the design of particular products developing over the coming year.

Entering our sixth, we’d like to think that PIP has, like a teenager, grown comfortable in its own skin; combining serious content and technical information with, where suitable, a certain levity. That’s because we know our readers are intelligent individuals who will always carry out their own research into products to ensure their suitability.

Mention should be made of our ongoing PIP Seminar series, which regularly fills the upper rooms at 66 Portland Place, bringing innovative architectural projects and products to a professional audience. I’m delighted both that the architects young and old that I meet find them genuinely useful, and also by this maturation of the PIP brand. Not so small after all. •

Jan-Carlos Kucharek, editor

More online...

An overall reduction in energy use of 2.6 per cent is required year on year and the average building energy use per person globally needs to fall by at least 10 per cent.

Stephen Cousins reviews Sandy Halliday’s updated guide to sustainable construction: ribaj.com/sustainablehalliday

Compendium .................. 04
Tech IT/Books .................. 06
On trend .................. 08
Extreme spec .................. 10
Roofing .................. 14
Costed: Roofing .................. 23
Specified: Roofing .................. 24
Analysis: Energy efficiency .................. 26
Doors, windows & ironmongery .................. 28
Specified: Doors & windows .................. 34
Seminar: Education .................. 36
Interiors .................. 38
Specified: Interiors .................. 40
Sign Up...Sign Off .................. 42

Cover image: The V&A Photography Centre by David Kohn Architects, photographed by Will Pryce
Open the Pod bay doors, HAL
Like Stanley Kubrick’s 2001, the sky's the limit with Sunsquare's latest offering to the rooflight world. As a space-saving alternative to other versions, it’s created its Aero Dual flat-roof skylight, whose two synchronised panels hinge open to 90° at the touch of a button, freeing up space in your roof garden that may be at a premium. The glass is laminated and seals are backed by a 25-year warranty. Units are, says the PR, the only flat-roof skylights to hold a BSI Kitemark, and offer accessories including an intelligent rain sensor or full weather sensor pack, which will close the windows automatically if it starts to rain or the wind gets up. They can be made to any specification and size up to 4.6m² so allow for bespoke solutions. Which should all come in handy when you need to get the random monolith that just appeared on the roof down your spiral access staircase.

Metal guru
If you’re always associated stainless steel toilet pans with rail station toilets and prisons, trust those design savvy Italians to turn preconception on its head. Luxury sanitaryware manufacturer CEA has created what seems the Bang & Olufsen for toilets with its ABACO modular system designed by Natalino Malasorti. Its modular nature provides mix and match flexibility and easy installation in a design that’s both hygienic and durable. If you’re wondering where the loo is here, it’s on the far right, beneath a lid, like a 21st century commode. This is the bathroom in a future Hollywood celebrity prison. They should do Cribs episode on it.

Hamburg curve
There's a lot of bling around Hamburg’s Aussenalster urban lake, now added to by former partner of Will Alsop, Jan Störmer. The just-opened, 130-room luxury Fontenay hotel makes the best of the view with its white, sinuous form in its own parkland. Swiss company Sky-Frame provided the 5000m² of triple-glazed frameless sliding doors allowing lucky guests to enjoy views of Hamburg’s famous five churches, safe from blusters sweeping down the Elbe or drunken whoops from the Reeperbahn.

Heart of stone
For anyone that has been mesmerised by film maker Yuri Ancarani’s short film ‘Il Capo’, about the stone mason directing the cutting of enormous slabs of Carrara Marble in a quarry in Italy, you’ll understand why the sight of any picture of natural marble popping into PIP’s inbox can set us all a-flutter. Stone supplier Gerald Culliford benefited from that frisson this month when it sent in a press release for its exotic ‘Opera d’Arte’ range of French marble, which presents some kaleidoscopic colour effects ranging from black to deep, intense violet, lighter lilac and hints of green.
Light bulb moment
With 2019 being the 100th anniversary of the Bauhaus, you’d be forgiven for wanting to cash in on the legacy of some of the greatest designers of the modern age. Because, unless you’re a National Socialist, what’s not to like about the influential design school that was headed by Walter Gropius, Hannes Meyer and Mies van der Rohe until the Nazis forced its closure in 1933? Luxury lighting manufacturer Bert Frank has been inspired by the masters with its Bauhaus range – like the Stasis Wall Lamp (pictured) that, ahem, shines a light on the ‘clean geometric forms, bold shapes and functionality’ that have helped ensure the school’s reputation lives on to this day.

Doppelganger
Gyms are an intrinsic part of generating our Instagram selfie personas – and themselves need to look good to boot to get those trend-conscious vloggers in. Cue architect Studio RHE’s latest £5 million cosmetic work in the City of London for hip health club ‘Third Space.’ Though set in the basement of the curiously neo-gothic, post-modern Minster Court, it takes the form of frenzied deconstructivism. To help the effect along, Studio RHE used 3D modelling to help engineer the tessellated copper effect ceilings in the pool and reception area. Formed of laser-cut and folded steel panels, they were stained copper and polished to provide a mirror effect so you’re never more than a short, narcissistic gaze away from your perfect self.

Time, gentlemen, please...
Diners in Mike Leigh’s ‘Abigail’s Party’ might not agree, but design duo Edward Barber and Jay Osgersby say dinner parties are done. In their latest office-based collaboration with furniture designer Vitra they declare: ‘The workstation is going the same way as the dining room – it’s disappearing as an archetype. The desk has had its day.’ Pooh-poohing office beanbags, their ‘Soft Work’ range is sharp, tailored, modular seating with bespoke options to add desk surfaces, power outlets, charging ports and data connections. It even has seat ‘partition screens’; presumably the tech start-up equivalent of pub bar ‘snob screens’. Echoing the opinions of Abigail’s guest Laurence before his heart attack, that implication of undesirable neighbours seems to suggest money might not buy class.

Towering achievements
The 2018 Brick Awards at the end of last year saw a roll-call of the great and the good celebrated. Its supreme winner was Stirling Prize nominated architect MUMA for its Storey’s Field Community Centre & Nursery in Cambridge. The competition was stiff. RIBA judged by the sublime Walthamstow Wetlands project by former Stirling winner Witherford Watson Mann, which was longlisted in this month’s MacEwen Award and won the Brick Awards’ refurbishment category. WWM’s refurb and adaptation of two redundant Victorian buildings called for some expert brickwork in the reinstatement of the tower on the former engine house – the new visitor centre.
AI is no threat to our greatest skills

Last year Alexa celebrated her fourth birthday by sponsoring a well-known TV programme about baking. Was 2018 the year that artificial intelligence (AI) went mainstream?

In October I visited Digital Construction Week in London, a trade show for digitisation in the design, construction, and operation of buildings. And alongside the usual array of products, companies were there applying AI in the design process for the first time.

US-based company ALICE (why are so many robots and virtual assistants assigned female genders?) has software to automate the process of scheduling in construction. The tool needs a set of ‘recipes’ to be defined for each element of a project, eg pouring a slab or forming a column. These recipes include information about material and labour requirements, and cost. The software uses this information and a BIM model to optimise the construction sequence for parameters such as cost and programme duration.

This approach could bring transparency to the production process and the tool could be useful early in a project to explore how designs can affect programme. This could give clients accurate advice on the likely lifetime of a project.

Kreo is a young company providing software products with some of the functionality of ALICE, and also targets the design stage more explicitly. The basic functionality partly helps to automate the validation of BIM models. However, the use of AI is more extreme in Kreo Design which promises to ‘simply select the size, shape and location of your proposed building’.

This sounds a lot like an automated designer. Should design professionals worry about this?

The government’s creation of the Centre for Data Ethics and Innovation picks up on society’s concerns over data collection – and that automation threatens jobs.

There is often a natural recoil from AI technologies. However, it is important to engage with the technology available and shape it to serve our purpose. On Kreo’s website there is an interesting blog: ‘Machine learning tools can analyse data – learning from previous assumptions – and use its insights to continuously improve its decisions. It then uses human intelligence to enhance its insights even more over time.’

Machine learning is a subset of AI which is only as good as the data it receives. So if the source of data is limited, a bias will be generated.

It’s important to remember that these packages are just tools which can free up time for us to focus on the evolution and communication of more nuanced aspects of design.

A report from Get it Right Initiative stresses how investment in design improves the accuracy of information and so cuts costs. When employing these tools, designers must not use time savings to reduce fees; rather the time must be used to improve quality, where human, rather than digital designers can best apply their skills.

Dan Cash is a building services engineer and senior lecturer at the University of the West of England.

Books

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Overgrown: Practices between Landscape Architecture & Gardening

Julian Raxworthy. MIT Press. 364p HB £24

The author, a landscape architect from Australia at Cape Town University, starts with his own view of the French landscape tradition, making observations on Le Nôtre’s formal Vaux-le-Vicomte and the more naturalistic 1630 Château de Cournances in the south west. In his paean to the art of gardening, having paid visits to both, he describes his preference for the latter with an erudite sensibility that stretches the length of his personal, in-depth study of the art of gardening. He argues, using historic examples, for the ‘viridic’ (verdantly green) landscape the way architects demand the ‘tectonic’ of space. His argument is built on the study of six gardens; from Courances to a modern Scottish architect’s ‘marginal’ one, barely distinguishable from nature. Photos are mostly the author’s own, the colour-saturated bowler image on the cover hints at the joys to come.

Living Buildings. Architectural Conservation: Philosophy, Principles and Practice

Donald Insall. Images Publishing. 272p HB £35

It’s not often we run a book that is about a firm self-publicising itself, but PIP felt that in its 2nd edition, and with 60 years’ experience in the field of conservation, this book merited it. Skip the first chapter – there’s a bit too much self-aggrandising in its pages – but there’s good intelligence on approaches and methodologies to be gained in the later sections, from the firm that’s been responsible for the conservation strategy of the City of Chester, Windsor Castle, and numerous Oxbridge Colleges, stately homes and City institutions. Insall’s ‘Ten Degrees of Intervention’ for conservation is digested on p.208-09, in case you hadn’t been paying attention to the previous 200, although the charming pics should make that difficult. And the foreword was written by Prince Charles from Clarence House, no less. Who’d have thought?!!

Value in the View: Conserving Historic Urban Views

Tony Brigden. RIBA Publishing. 160p PB £32

The product of the author’s doctoral research, this thesis starts with Britain’s first famous ‘protected’ view of St Paul’s dome from Richmond Hill, starting off as an aesthetic, picturesque construct that, he argues, became a planning and a political one. After an intriguing foray into the nature of the ‘view’, which includes a brief history of the male ‘gaze’, Brigden goes further afield to analyse historical and contemporary view policy in Dresden, St Petersburg, Istanbul and Vancouver. The last section of the book ends with how we might develop an international approach to them seen through the polarising views of UNESCO, the ‘hegemonic gaze’ and ‘brandscape’. Copiously illustrated, not least with some of Brigden’s own compelling 2D ‘view cones’, it’s a shame it’s all in black and white. Colour would have made the book really sing.
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Ceramic tiles

In the first of a new regular section, Michael Willoughby looks at the ceramic tiles market and gets some style pointers from the industry.

Wall tile trends are set in Italy and Spain with products premiered at two annual shows, Cersaie Bologna and Cevisama Valencia. A few companies have their own designers; but the rest follow behind. Andrew Chappell, area manager of VIVES Ceramica, bemoans competitor ‘plagiarism’ – most recently made possible by the technological advance of rotocolour printing on tiles.

Bigger is better for many buyers: Michele Colò of Ceramiche Caesar says the large format tiles his company debuted three years ago are increasingly popular, prompting it to roll out even larger sizes of up to 320cm across.

But trends move slowly, points out Colin Roby-Wexford, sales and marketing director at Fired Earth, because it’s only in hospitality that tiles are likely to be replaced. While the fashion for tiles that mimic materials such as wood, concrete and even chipboard is a few years old, it is proving slow to progress, perhaps due to ceramic and porcelain being more durable and easier to clean than natural products.

Roby-Wexford claims colour is ‘replacing stone and wood lookalikes’ but Lutzía Ortiz-Miralles, head of product design and ceramic trends at Instituto de Tecnología Cerámica, says designers are creating many new lines, including those that look like floorboards. And Kaza Concrete’s Weave design might be taken for rubber, says Domus’ sales manager Jules Achard.

Two of our tile design mavens say tiles are getting more colourful and Achard adds that ‘neutrals’ is one of the least searched-for terms on a popular materials procurement portal. As to what colours are in favour, it depends who you ask. Roby-Wexford is seeing more northern European or Mediterranean grey-blues and pale pinks, with bolder pinks, reds and yellows in hospitality. Levi Wright, architectural specification manager at CTD Architectural Tiles, sees a shift to dark navy or pastel colours, and a move in metallics from copper to gold. Achard adds that ‘Millennial pink’ is hanging on but that the trend is for mid-century colours such as wine-red, green and mustard. Ortiz-Martin also sees a ‘new art deco with an alliance of tradition and design... grey, moss green, intense blue or black’.

Experts disagree as to whether geometric patterns – a gift of water-jet technology – are in fashion or on the way out. Ortiz-Miralles believes they ‘play a major role’ and Roby-Wexford and Chappell agree. But Achard thinks people have ‘had enough’ of them and are moving towards curves and smaller, tessellating shapes.

A trend that most experts are ready to call time on are glass mosaic tiles as found in bathrooms up and down the land. Roby-Wexford reports they are ‘not doing so well’, while Achard says they have been replaced by ceramic and porcelain in wet rooms. But that doesn’t mean glass is dead. ‘People are instead looking for arabesques, fans, and foil-backed antique styles for feature walls,’ says Roby-Wexford.

Fired Earth’s 20cm by 20cm by 1.6cm porcelain tile from its Encaustic range (£8.99) is handmade in Portugal in four colourways. The designs follow a direct influence from the 12th century Cistercian potters. Retaining a Mediterranean feel, the tiles make a style statement wherever they’re used. The popularity of the floor tiles has encouraged Fired Earth to create its range of wall tile patterns.

Slightly more sophisticated and, at 30cm by 30cm by 1cm, a bit larger, is the firm’s Sorrento (£8.83), a highly decorative porcelain tile designed to add depth and pattern to a room. Named after the Bay of Naples town famous for its chic hotels, they pick up on its mid-century vibe and bring considerable flair in nine varied designs from the 18th century-style Caselle to a far more contemporary Nizza (below).
Tiles are getting increasingly large, and Vives’ 45cm by 120cm Kamala concrete effects are some of the largest. The landscape format reduces the requirement for grouting and boosts homogeneity. Kamala consists of the base tile available in white, cream, grey and graphite. These are complemented by fresh designs with a contemporary character including geometric patterns. The range also includes two pure white wall tiles, one in matt finish and the other in gloss. Vives is also the company behind the Strand range of porcelain tiles (above), which imitates chipboard, and the Stracciatella range – the terrazzo tile made from the same material so it can be used outside and with oversize marble inclusions that architects particularly like.

**DOMUS**

The south London-based company launched Note’s undulating rhythmic Kaza tiles at Clerkenwell design week in 2017. The product was inspired by sand dunes and traditional weaving techniques and consists of three individual styles in two different sizes – ‘Maldives’, ‘Kalahari’ – and a flat piece. The design studio likes to describe the product as ‘liquid stone’.

Far more traditional are the company’s handmade tiles from central Portugal, which come in a variety of shapes from triangles to hexagons via scales (below). Additionally, the New Terracotta collection encapsulates ‘wabi sabi’ – the beauty of imperfections. Since each tile is made individually by hand, no two are ever the same, resulting in a tactile quality to the finish and shape. Subtle shade variations, irregular edges and small imperfections are part of the time-worn aesthetic, making no two tiles the same.

**CTD ARCHITECTURAL TILES**

Working with Cevica and Harmony, the San Gobain subsidiary is creating handmade effects such as rustic edge and fish scale designs – making them an idea feature in a bar front or behind the bar.

CTD is also going large on slimmer wide-format porcelain tiles at just 6mm wide. Marazzi’s Grande range has a strong marble and concrete look for a collection of porcelain stoneware slabs. These are suitable for both horizontal and vertical flat surfaces, from design features to the facades of buildings, either indoors or exteriors. The material (6mm 120cm by 120 cm and 120cm by 240cm) can be made to measure and laser cut to meet all project requirements. The Marble look comes in eight colours – Golden White, Lasa, Statuario, (below) Altissimo, Raffaello, Brera Grey, Frappuccino, Saint Laurent – and two surfaces: natural and lux. The Grande Concrete Look comes in eight colours: Sand, Crete, Mud, Smoke, Graphite Natural surface.

Meanwhile, the company’s Reef tile was most popular at the Bologna fair in September and is ocean blue but with textures reminiscent of Corten Steel. The ‘burnt’ tiles are complemented by brush-surface options with micro-abrasions on the surface, the former more minimal and the latter more decorative.

Also popular is 3D decoration. The Core range, inspired by natural and volcanic stone, resembles waves with the projections and hollows creating an interplay of light and shadow.
A new form of concrete could improve its green credentials by incorporating plastic in the mix. An international team of researchers has swapped sand for waste plastic, making a product that has the potential to cut the material’s carbon emissions and recycle plastic.

The research, conducted by the University of Bath in partnership with India’s Goa Engineering College and published in the journal Construction and Building Materials, was prompted by a severe sand shortage in India as the country experiences an unprecedented construction boom.

At the same time waste plastic is rarely recycled in India, with as much as 40% ending up in landfill. The study found that by replacing 10% of the sand component of concrete (typically 30% of the total concrete mix) with finely ground plastic particles, a target compressive strength of 54 MPa was achievable – similar to that of structural concrete and potentially saving around 820 million tonnes of sand per year.

Dr Richard Ball, from Bath’s department of architecture and civil engineering, told RIBAJ: ‘This is timely research. Waste plastic is a big problem and people’s awareness of the associated drawbacks is heightened. Putting it into concrete is one possible solution. This work has demonstrated that it warrants further investigation.’

Researchers examined the impact of five finely graded plastics on the structural strength of concrete tubes and cylinders, experimenting with different particle sizes, ratios of sand to concrete, and two different chemical treatments. They tried to strike a balance between adding enough plastic to make a worthwhile impact on sand use while ensuring that the concrete produced was not too weak.

Sand-sized Polyethylene Terephthalate (PET) particles derived from recycled plastic bottles provided the best results, achieving the target compressive strength.

Using synthetics like plastic in concrete generally weakens the material because they do not bond to the cement mix as well as sand. Properties such as the type of plastic, particle size and shape, and the rheology of the wet mix all have an influence on the strength of the finished concrete.

However, even if the strength of the concrete is compromised and unsuitable for structural applications, there may still be end uses, such as for paving slabs.

Ball admits there is variability in the results and to ensure there are no longer term structural issues, additional tests will be needed to the rheology of the wet mix, environmental durability and fire performance.

He adds that waste ocean plastics may not be suitable for the process, as much of the material is likely to have degraded by being exposed to UV light and salt water. ‘It is something that’s worth investigating further,’ he says, ‘Waste from a recycling plant also tends to be variable in terms of its properties. There is a mix of different types of plastic and there could be contamination from other materials. The composition over days, weeks, months and years at the plant is likely to change based on what waste is going in and what is coming out.’

Waste plastic from industrial processes could provide a more uniform consistency and the researchers have been in discussions with a firm that recycles PVC window frames as ground plastic with a small particle size.

It is estimated that more than 20 billion tons of concrete are produced globally each year, making it the world’s second most consumed substance after fresh water. Environmental concerns arising from the over-dredging of sand in India have led to restrictions on its extraction, with a direct economic impact on concrete construction.

The Indian central pollution control board reported in 2008 that approximately 15,000 tons of plastic waste is dumped every day in India. Non-biodegradable plastic waste is inert and breaks down very slowly once buried in landfill.

UK construction still relies heavily on single use plastic packaging, principally plastic films, that are typically bundled up and incinerated at energy from waste plants. Large quantities of plastic end up in general mixed waste and are impossible to recycle either because they cannot be identified or they are contaminated with other materials.
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Above Southwest elevation of the complex showing the park-facing amphitheatre. The 35,000m² standing seam roof covers the Banyan Plaza, four music halls, lobbies and all their support and admin spaces.
Even Mecanoo was surprised by the vast scale of this scheme, but its complex, undulating roof tailored to a sub-tropical climate binds all its halls together.

Words Jan-Carlos Kucharek  Photographs Iwan Baan

It comes as no surprise to discover that Dutch firm Mecanoo looked to shipbuilding techniques to realise its £258 million National Kaohsiung Centre for the Arts in Taiwan; you could easily fit a supertanker within its vast dimensions. But it turns out those techniques were on tap – Kaohsiung is the island’s third largest city, and a major port. Opening to great fanfare at the end of last year, the centre is sited in the 47ha Weiwuying Metropolitan Park, urban parkland released by the decommissioning of a former military base. The new 14.1ha complex sits at its north east corner, the centrepiece of a huge urban regeneration project.

And its cultural ambition, it seems, is just as expansive. Keen to be an integral part of the Asian tour circuit of the world’s leading orchestras and opera companies, the city ran an international competition in 2007 for a state-of-the-art cultural centre. It eventually plumped for Mecanoo, which was itself taken aback by the scale of the brief. The result is the world’s largest arts and cultural complex to be built in one go – a 2,250-seat opera house, 2,000-seat concert hall and all manner of ancillary spaces.

Products In Practice January/February 2019
Roofing

Site plan and Banyan Plaza level

First floor plan

Upper level

Products In Practice January/February 2019
ribaj.com
The architect’s response was on appropriately grand scale – the creation of a massive, sweeping, undulating steel roof rising to a height of 38m, that encompasses all the halls beneath it; each space denoted by clearly discernible undulations across its surface. But another key aspect of the winning proposal was the 24-hour covered public space that flows around the five music ‘pods’ and allows fluid connections between the park to the south and public transport and road links to the north and east. On the elevation facing the park, the roof curves down to meet the ground, creating a sizeable outdoor amphitheatre.

Mecanoo technical director Friso van der Steen explains that the design concept originated from their exploratory visit to Taiwan before the competition submission. Banyan trees growing wild on the base had dense, protective canopies, and inspired the covered public space that the firm came to call the Banyan Plaza. The group also gained a sense of the Asian aspects it would need to bring to this western cultural typology. ‘In this subtropical climate, the cool of the night allows life to be lived on the street and we wanted that to form part of the brief for the arts centre,’ he explains. ‘It’s hot in the day, and when it rains it pours. The covered plaza is not only shaded and dry but its cross-breeze makes it a few degrees cooler. It’s a space that anyone and everyone can use and puts them close to the cultural events. If they end up buying a ticket to see a show, that’s all for the better,’ he adds.

Yet to merely call the 225m long by 160m deep steel structure a roof would be an oversimplification. Springing from the concrete ground and basement levels, where all the backstage, rehearsal and service areas are housed, the complex steel frame forming the broad arches of the Banyan Plaza supports multiple levels of foyer, restaurant and admin spaces; a programme squeezed into a section that’s in turn covered by the final roof layer covering the whole complex. Bearing in mind the necessary seismic considerations, local engineer Supertech wanted to make use of any structural purchase it could; an idea that Mecanoo, despite aesthetic ambitions, was prepared to run with. The concrete
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walls of the six pods rising from the base were obvious anchor points for the frame. ‘We had no interest in making the structure any more complex than it was, so allowed as many connections between the frame and pods as we could,’ recalls van der Steen, adding that the design was an iterative BIM process, with drawings passing constantly between the office in Delft and Kaohsiung.

Local shipbuilders’ fabrication of the steel proved revelatory for Mecanoo, keen for a robust structure and skin. Van der Steen found the collaboration inspirational as it involved a change in thinking. At initial meetings, he recalls, he was asked merely for the ‘total weight’ of the building so it could be costed. Then later, the Plaza’s 6mm thick steel wall plates which clad the steel frame were neither needed nor desired to repeat, as shipbuilders are used to cold forming hulls to complex curvatures. Similarly, they were happy for not all the plates’ rear stiffeners to be of the same section. Rather they thicken anywhere they’re being used as fillets for the sprung suspension rods connecting them back to the main steel frame. ‘On a ship any extra deadweight means added fuel costs so any opportunity to minimise this is taken,’ explains van der Steen. And when the architect asked what tolerances they worked to, the reply was, understandably when you think about it, ‘zero’. With hindsight, van der Steen wonders if they should have risen above their own doubts and accepted the shipbuilder’s outlandish offer to fabricate the whole facade and roof out of steel too, adding ‘Never has a ship-building technique been applied on such a large scale in an architectural project. I admired their “can-do” attitude, not least from its sustainability angle.’

Despite the seeming wilfulness of the structure, it for the most part adheres to basic rules, working on a 6m by 6m grid of nodes unless the concrete pod structure precludes it. This mesh of steel supports the foyer floors, allowing vertical circulation to the upper level hall spaces—and ultimately the roof, as it sails over the halls and flytowers.

The final roof layer is complex, having to generate the undulating form, act as an acoustic barrier to the drumming monsoon rain and perform as a waterproof layer. Van der Steen explains that the final layer might only be 1.2mm of aluminium standing seam but beneath it is a 1m layered section of secondary waterproof membrane, bonded calcium silicate tiles to deal with sound, two Rockwool insulation layers, supports and segmented top-hat section to allow the roof to assume the form of the complex steel structure. There was a thermal...
Roofing

insulation component too, to ensure the uppermost steel didn’t expand unduly relative to the more ‘shaded’ structure beneath.

Van der Steen states that aluminium sheet roof cladding is not very forgiving of inconsistencies and that, while looking straight in plan, the undulations in the roof meant tapers as the aluminium standing seam ran along its length. Close co-ordination of the 3D roof model with the German roofing contractor was essential. The firm rolled out and cut the 1.2m wide aluminium coil down to a minimum of 400mm as per the BIM model, on site, before hoisting it to the roof for fitting. The contractor was challenged to produce a portion of the roof’s steepest curve before being appointed; the architect has nothing but respect for what it achieved here.

Naturally, rainfall gutters are enormous; here 750mm deep and 500mm wide, repeating at 18m centres over the 35,000m² roof area. This compartmentalisation rapidly transmits the water to a balancing pond via syphonic drainage. With the standing seam roof fixed at the mid-point of the 18m spans, the aluminium can thermally expand and contract into this gutter area. Although the skylights that puncture the roof look random, in fact they nestle within that 6m by 6m structural grid area, requiring only one section of it to be removed.

Taking seven years from breaking ground to commissioning, the project looks to have occupied a substantial chunk of van der Steen’s career. But his take is different: ‘Relatively speaking, it took 18 years to build the Hamburg Philharmonie and Nouvel’s Philharmonie de Paris cost almost €300m. This took far less time and at £258 million is a very cost-effective building,’ he concludes. ‘The city is getting an awful lot of opera house for its money.’

Credits
Client Preparatory Office of
The Wei-Wu-Ying Center for
the Arts of the Ministry of
Culture, Taiwan
Architect Mecanoo
architecten
Local architect Archasia
Design Group
Structural engineer
Supertech
Mechanical engineer Yuan Tai
Electrical engineer Heng Kai
Acoustic consultant Xu Acoustique
Theatre system Waagner-Biro
Theatre consultant Theatersalies; Yi Tai
Lighting consultant CMA lighting
Fire safety consultant Ju Jiang
Organ consultant Olivier Latry
Roof and facade consultant CWI
3D consultant Lead Dao
Traffic consultant Su International
Contractor Chien Kuo
Construction Co
Steel skin Centraal Staal Groningen; Ching Fu
Organ builder Klais

Left Banyan Plaza: the band of windows denotes the longer, central, Lyric Theatre and provides orientation.
Below left Inside the Hans Scharoun-inspired concert hall.
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PermaQuik

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Costed

David Holmes, associate at AECOM, provides an overview of roofing costs

What type of roof covering to use is influenced by the pitch of the roof. One with a shallow pitch, below 30° of slope, will require consideration as to which type of roof covering to use. Commonly, roof tiles allow for a shallower pitch, sometimes as low as 12.5° for certain makes compared to 20 – 22.5° for selected slates.

The most common type of roofing tiles are made from cement or clay and are a popular choice particularly for modern homes. Cement tiles are cheaper, costing around 70p compared to a clay tile which is priced at around £1.20.

The difference in price reflects the durability of the tile. Cement tiles normally last between 40 and 50 years but clay are longer lasting, giving 50-100 years of wear.

Slate is often found on period or traditional homes. Its colour and texture, created by layering, provides an attractive aesthetic. Compared to tile roofs, natural slate has a longer lifespan, lasting 120 years or more. It is also more expensive, as more slates will be needed to cover the roof.

Taking care of any roof generally involves a yearly check-up looking for any damaged or missing tiles. Keeping gutters clear is also important.

The rates below are a guide to roofing costs as at 2018 Q2. No allowance is made for sundry or related preliminaries. VAT is excluded.

### Typical residential roofing costs

**Average cost to roof with plain tiles**

<table>
<thead>
<tr>
<th>Housing Type</th>
<th>Range £</th>
<th>Range £</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two bedroom terrace house</td>
<td>£3,600-£5,800</td>
<td>£6,000-£8,000</td>
</tr>
<tr>
<td>Three bed semi-detached house</td>
<td>£4,500-£7,000</td>
<td>£7,000-£11,000</td>
</tr>
<tr>
<td>Four bed detached house</td>
<td>£5,500-£8,750</td>
<td>£8,000-£12,000</td>
</tr>
</tbody>
</table>

### Average cost to roof with slates

<table>
<thead>
<tr>
<th>Housing Type</th>
<th>Range £</th>
<th>Range £</th>
</tr>
</thead>
<tbody>
<tr>
<td>Two bedroom terrace house</td>
<td>£3,900-£6,000</td>
<td>£6,000-£8,000</td>
</tr>
<tr>
<td>Three bed semi-detached house</td>
<td>£4,800-£7,000</td>
<td>£7,000-£11,000</td>
</tr>
<tr>
<td>Four bed detached house</td>
<td>£6,200-£11,000</td>
<td>£11,000-£15,000</td>
</tr>
</tbody>
</table>

### Flat roof: Systems

**Includes insulation (U-value = 0.25W/m²K) and vapour barriers as necessary; excludes decking**

<table>
<thead>
<tr>
<th>Material</th>
<th>Range £</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single layer polymer roofing membrane; insulation</td>
<td>£84-100</td>
</tr>
<tr>
<td>Single layer polymer roofing membrane; taper insulation</td>
<td>£140-170</td>
</tr>
<tr>
<td>20 mm thick polymer modified asphalt roofing including underlay</td>
<td>£98-115</td>
</tr>
<tr>
<td>High performance bitumen felt roofing system</td>
<td>£94-110</td>
</tr>
<tr>
<td>High performance polymer modified bitumen membrane</td>
<td>£110-130</td>
</tr>
<tr>
<td>Kingspan KS1000TD composite single ply roof panels for roof pitches greater than 0.7° (after deflection); 1.5mm single ply external covering, internal Coating bright white polyester (steel)</td>
<td>£63-76</td>
</tr>
</tbody>
</table>

### Pitched roof: Tiles or slates

**Includes reinforced underlay and battens as necessary; excludes roof structure**

<table>
<thead>
<tr>
<th>Material</th>
<th>Range £</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural Welsh slate tiles</td>
<td>£119-230</td>
</tr>
<tr>
<td>Natural Spanish slate tiles</td>
<td>£120-150</td>
</tr>
<tr>
<td>Synthetic slate tiles</td>
<td>£70-90</td>
</tr>
<tr>
<td>Reconstituted stone slate tiles; random slates</td>
<td>£190-230</td>
</tr>
<tr>
<td>Clay pantiles</td>
<td>£82-60</td>
</tr>
<tr>
<td>Clay tiles; handmade; sand-faced plain tiles</td>
<td>£88-150</td>
</tr>
<tr>
<td>Concrete tiles; interlocking; troughed / bold rolled</td>
<td>£40-65</td>
</tr>
<tr>
<td>Concrete tiles; plain</td>
<td>£38-65</td>
</tr>
<tr>
<td>Fibre cement slates</td>
<td>£42-60</td>
</tr>
<tr>
<td>Red Cedar sawn shingles; preservative treated; uniform length</td>
<td>£75-95</td>
</tr>
</tbody>
</table>

### Pitched roof: Sheet metal

**Includes breather membrane, underlay or vapour barrier as necessary; excludes roof structure**

<table>
<thead>
<tr>
<th>Material</th>
<th>Range £</th>
</tr>
</thead>
<tbody>
<tr>
<td>Copper sheet; mill finish; flat seam or wood rolled</td>
<td>£190-235</td>
</tr>
<tr>
<td>Copper standing seam roof; mill finish</td>
<td>£180-225</td>
</tr>
<tr>
<td>Extra for pre-patinated copper finish</td>
<td>£40-70</td>
</tr>
<tr>
<td>Aluminium sheet; mill finish; wood roll; insulation (U-value = 0.25WK)</td>
<td>£80-135</td>
</tr>
<tr>
<td>Aluminium sheet; standing seam; mill finish; insulation (U-value = 0.25WK)</td>
<td>£80-140</td>
</tr>
<tr>
<td>Extra for Pvf2 aluminium finish</td>
<td>£10-20</td>
</tr>
<tr>
<td>Stainless steel; terne coated sheet</td>
<td>£170-200</td>
</tr>
<tr>
<td>Lead roof covering; code 7; welded seam; milled lead; laid flat</td>
<td>£160-180</td>
</tr>
<tr>
<td>Lead roof covering; code 7; welded seam; milled lead, pitched roof</td>
<td>£160-200</td>
</tr>
<tr>
<td>Zinc; Natural Bright Rheinzink; pitched</td>
<td>£120-150</td>
</tr>
<tr>
<td>Extra for pre-weathered zinc</td>
<td>£20-30</td>
</tr>
</tbody>
</table>

### Pitched roof: Fibre-cement sheet

**Excludes roof structure**

<table>
<thead>
<tr>
<th>Material</th>
<th>Range £</th>
</tr>
</thead>
<tbody>
<tr>
<td>Profile 6 fibre cement; single skin; natural grey finish</td>
<td>£28-40</td>
</tr>
<tr>
<td>Insulated system (U-value = 0.25WK); Profile 6 fibre cement external skin; metal lining panel internally</td>
<td>£55-80</td>
</tr>
<tr>
<td>Extra for coloured fibre cement</td>
<td>£1.75-2.25</td>
</tr>
<tr>
<td>Double skin GRP translucent sheeting</td>
<td>£60-75</td>
</tr>
<tr>
<td>Triple skin GRP translucent sheeting</td>
<td>£70-90</td>
</tr>
</tbody>
</table>

### Landscape roof

**Excludes decking**

<table>
<thead>
<tr>
<th>Material</th>
<th>Range £</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extensive sedum type flat roof; growing medium; waterproof layer; separation layer; low maintenance</td>
<td>£240-320</td>
</tr>
<tr>
<td>Extensive rockery type green flat roof for rockery type plants; growing medium; waterproof layer; separation layer; low maintenance</td>
<td>£225-350</td>
</tr>
</tbody>
</table>
Specified

1. Wildflower vegetation blankets
   Bauder

   ‘No, I’m terribly sorry, darling, but Jolyon’s not taking any calls today. He’s up on the Pavilion shopping centre roof, crying. Why? Oh, he’s just found out about the new jute carriers Bauder has incorporated into its vegetation blankets. Yes, dear. Yes. The blankets themselves would have been hard enough, but when he heard that they’re now 100% biodegradable, I’m afraid he had another of his Stendhal syndrome turns. Yes... yes, I know! The back brace, the hernia repair, and now this. I’ve asked George Monbiot to come and try to talk him down.’
   bauder.co.uk

2. GreenCoat colour coated steel
   SSAB

   The world’s gone mad Martha – first there’s that Mr Attenborough showing us whales wearing plastic they picked up from a Pacific Island that’s entirely made of the stuff, and now there’s this Baltic Station Market in Estonia which has coated the steel panels of its sawtooth roof with rapeseed oil! Better than hydrocarbon oils apparently, this GreenCoat technology – all part of SSAB’s contribution to the building’s refurbishment. It’s all wrong if you ask me. Oil’s for frying, fish don’t need to dress theirselves and you flush plastic down the loo like we always did.
   ssab.co.uk

3. Rubershield membrane
   IKO

   They say your school days are the best time of your life but how can they be with double maths every Friday and Mr Bishop swearing at the year 7s all through games? St Cuthbert’s wasn’t so bad though: we could slip through the rotting attic window onto the roof for muffled parties on Saturday nights with smuggled Party 7s and Prendergast’s mum’s duty free Silk Cuts. Not to mention McTavish’s forbidden fruits. No chance of such japes at Abbey Hill Academy, whose roof has been sealed and secured by IKO slates, flashing and membrane, keeping the elements out and the miscreants in.
   ikogroup.co.uk

4. Heritage rainwater pipe
   Alumasc

   Dilemma upon dilemma! First, whether to preserve the little ferns that sprout so sweetly at the breaches, or to spend one’s tiny stipend on a listing-compliant replacement for weeping but pricey cast iron? But then: price or authenticity? My dedication to Georgian living means the 40 years afforded by the inexpensive aluminium is a positive lifetime! What, indeed, would one do with iron’s extra years of corrosion? The saving represents a thousand suppers of port, mutton, bonbons, jersey cream and butter. Hennessy! Pies! And many of them!
   alumascrainwater.co.uk

Products In Practice January/February 2019 24-25_SPECIFIED ROOFING_RK_5.indd 24 17/01/2019 16:43
7 Aluminium rainwater system Guttercrest

‘This wood,’ snarled the witch, ‘is as wide as the meaning of maybe, as long as a sleepless night and as deep as the lines on a politician’s face. You have two impossible routes home: to find what eats the wood’s raindrops or to solve the question of Brexit.’ And cackling at her cunning, she disappeared in a puff of smoke. After copious weeping the children wandered for days debating the Irish backstop until they stumbled on a fantastic angular house, whose Guttercrest aluminium rainwater system drank up every drop of rain. And before you could say ‘Jean Paul Juncker’ they were home.
guttercrest.co.uk

6 Aluminium box gutter ARP

Miranda and I felt we needed to show our style unequivocally when we got the extension done. Certain of the neighbours needed to see they’d put us in the wrong box, so to speak. So we gave the orangery a nice round end – none of your ‘box on the back’ bog-standard home improvement for us, oh no. Only problem was the roof, how to get rid of the rainwater. Well, ARP’s pressed aluminium box gutter was the answer. As I said to Gerald in the clubhouse, it only goes to show that however hard we tried to think outside the box, we were boxed in at the finish. How he roared!
arp-ltd.com

5 Glendyne slates Cembrit

The Friends of Victoria Park managed to raise £6,600 from locals to help with their restoration of historic Netley Chapel in Hampshire. So I thought I’d take a leaf out of their book in re-roofing my own house. Didn’t go too well. Turns out the denizens of Hyacinth Gardens are quite reluctant to pay money to sign the underside of a slate, even if it is an imperial-sized 2-by-1 EN ISO 9001-compliant Glendyne slate from Cembrit with a 75-year guarantee. These people have NO DAMN VISION!
cembrit.co.uk

8 Heavy 3 Ballachulish-style slates Cupa Pizarras

Forget Swarovski! With Cupa Pizarras it’s really time to sparkle! Pyrite inclusions of up to 2mm mean you’re never under-dressed with a Heavy 3 roof! And where you need to co-ordinate with Scottish Ballachulish, the 7-8mm weight is the perfect partner for standing #roofsostrong against the gale and avoiding those embarrassing wardrobe malfunctions! In no-messing blue-black, these slates are the seasonal must-have for the autumn/winter 2018-9 dreich-soaked lass.
cupapizarras.com/uk
Most clients never used to give a second thought to insulation. Why would they? It was one of the most mundane and least visible elements of a building. But since Grenfell, clients and building users have quite rightly been questioning what lies within and on the walls. As Trish Andrews of the Centre for Alternative Technology (CAT) says: ‘This has suddenly become something that could affect your life.’

Events have the power to shift debate, if not policy. The industry’s conversation about insulation, which previously centred almost entirely on thermal performance and cost, now focuses on fire safety. It is going further to encompass such factors as human health and wellbeing and environmental impact. When that happens, oil-derived materials become less attractive and natural or recycled options come to the fore.

Materials such as wood fibre, sheep’s wool, hemp, recycled newspaper and even discarded denim jeans have been used to insulate one-off eco-homes and bigger sustainable projects for years. They have a successful track record in buildings like CAT’s own Wales Institute for Sustainable Education, constructed using hemp/lime, and can match the competition, argues Andrews: ‘Products like sheep’s wool are not far off the U-values of some non-organic materials.’

But these alternative products always seem to be on the cusp of making the transition from eco-project to mainstream, never quite able to make the decisive break into a market dominated by big name manufacturers and major housebuilder customers. Like many eco-products, natural insulation has been subject to the vicissitudes of government policymaking. ‘We were just on the edge of having leading environmental standards in housing, but now students coming to us don’t even know about the Code for Sustainable Homes,’ says Andrews, who is senior lecturer and studio tutor at CAT’s graduate school of the environment.

As a result, alternative insulation materials have not yet been integrated into construction regulation, documentation and practice. ‘There are no standard details in the Building Regs covering the use of natural insulation,’ says Andrews. ‘We’ve got regs for Passivhaus design now, and it’s very important that is tackled, but that relates predominantly to energy consumption. We still need to talk about renewable materials and the impact of materials on health and human toxicity. We need to talk about the ozone depleting substances in some materials. There’s a need for product labelling and easy guides, to show the impact of our decisions.’

In the absence of this guidance, it falls to others to plug the knowledge gap. Gary Newman, executive chair of the Alliance for Sustainable Building Products (ASBP), says his organisation sees natural insulation as having eight functions, including its hygroscopic characteristics in absorbing and releasing water, which help to minimise the risk of condensation and allied health impacts. ‘We should be using these materials because they are a better solution, rather than because they are green,’ he contends, believing that this case will strengthen as understanding of building performance grows.

Growing success
While the UK government has lost its appetite for sustainable building, action continues away from Westminster, not least in initiatives like the Welsh government’s innovative housing programme. Of the 20 projects in its first phase, some will be constructed using locally grown timber frame and allied products, including wood-fibre insulation. The programme will deliver homes and learning on such factors as cost, building performance and health and wellbeing. But importantly these projects will also generate local employment and could help...
to develop production capability for a sector that often relies on costly overseas production and a precious natural resource. As Newman points out, ‘Global demand for timber is expected to treble in 30 years’, and with only 14% forest cover, Wales has capacity for expansion.

Projects include a three storey block of 26 apartments in Newtown, which will be Powys County Council’s first council homes for three decades. The council has introduced a wood encouragement policy, which prioritises timber for construction and fit-out on council housing projects. It is also a partner in the Home-Grown Homes project, an initiative managed by Woodknowledge Wales that aims to improve the business case for timber construction. In the village of Llanbedr Dyffryn Clwyd, near Ruthin, housebuilder Williams Homes is working with housing association Pennaf Housing on a scheme of 36 houses and bungalows. The homes, designed by Simon Hall Architecture, will have an array of environmental features, including wood-fibre insulation. Although the scheme is part of an innovation programme, Williams Homes director Owain Williams says this is nothing new to him. ‘I have been using natural wood fibre as insulation for years,’ he asserts. ‘Using natural, low carbon materials is in our company DNA and we are committed to reducing embodied carbon in construction.’

The legacy of buildings constructed using these materials is making its own case. The point of view of air quality, natural light and space,’ says Architype director Ben Humphries. ‘It is in terms of embodied carbon and hygroscopic performance and tends to be better on cost than hemp or sheep’s wool.’ It also has good fire performance, thanks to the addition of a fire retardant such as boron, a point Humphries sometimes has to emphasise to sceptical clients.

Widening acceptance

There are, however, still projects where low budgets make it difficult to incorporate natural insulation, reveals Humphries, notably Education and Skills Funding Agency (ESFA) schools. ‘We’ve had conversations with the ESFA about it. These are exactly the locations where we should be using non-toxic materials.’ That said, Humphries believes natural insulation is making headway in the market. ‘It wasn’t so long ago that recycled newspaper insulation was called wacky, but now its qualities are recognised. Although insulation is locked away, we’re seeing greater public and client awareness, especially in areas such as working environments. We’re increasingly seeing it in client requirements,’ he says, adding, ‘I see it taking the same track as sustainable timber – 20 years ago, no-one required timber to have Forest Stewardship Council (FSC) or PEFC certification, but now it is the norm.’

Unusually, the architect is even applying recycled paper insulation on two masonry projects. Appropriately, a paper archive for the Imperial War Museum in Duxford, now under construction, has a block structure with an external insulation layer, while an upcoming concrete framed school in Machynlleth will have paper insulation and a timber framework.

Further innovation is emerging, with a number of products capturing the attention of the media and the market. One of the best known comes from Biohm, a start-up that spent two years exploring biomimicry and bio-based materials, including mycelium fungus-based products for a range of applications. So far its emerging products include an insulating board material, known as Orb (Organic Refuse Biocompound) for interior architecture and drylining, which is made using food and/or agriculture waste and achieves a variety of colours and finishes, as well as mycelium-based thermal insulation. ‘We’re moving from the aesthetic to the functional,’ explains the firm’s founder and director of innovation Ehab Sayed.

Biohm is aiming to literally grow insulation in 100% circular – zero waste – facilities, potentially housed in a converted barn in Wales and an old paper mill in Somerset, from where it will initially produce enough to supply demand for 20 homes a month. Production facilities are intended to be ‘community owned and community led,’ says Sayed. ‘They would provide jobs for the community, resources for local architects and designers, and recreational spaces and cafés, which would also sell the manufacturing facilities’ only by-product, mushrooms.’

Before this can happen, the product has to go through further testing and pilot projects. But Biohm’s progress to date exemplifies the barriers to be negotiated in trying to change the status quo. ‘It has been really challenging,’ stresses Sayed. ‘We know we can go beyond regulations, but it’s a question of finding the standard to meet. We couldn’t test the product against an existing standard so we want to work with BSI to create one.’ That could cost up to £100,000, and as Biohm is self-funded it is considering crowdfunding to secure the necessary finance.

Nonetheless Sayed mentions numerous industry names – including a major housebuilder, contractor and client – that are interested in using the product. ‘People are becoming much more open minded,’ he says. Perhaps that is an indication that the debate is shifting. •

Materials such as wood fibre, sheep’s wool, hemp, recycled newspaper and even discarded denim jeans have been used to insulate one-off eco-homes.
Immediately after World War II, the University of Edinburgh embarked on a period of expansion which saw a swathe of the southside of Georgian Edinburgh demolished to make way for a series of modernist buildings. This process is now framed as a clash between post-war planning and conservation and continues to rankle with some in the city. As the appetite for modernism waned, Edinburgh was left with a number of car park filled gap sites including the plot where the Bayes Centre now stands. In 2004 the university announced an invited competition for one of these sites. Bennetts Associates partnered with Reiach and Hall to win the commission which Bennetts then took forward. Always planned to be phased, the Informatics Forum completed in 2008 and the Bayes Centre opened in October 2018.

The Bayes Centre houses one of five Regional Technology Hubs integrating advanced data technologies including artificial intelligence, mathematical science, super computing and robotics. The building really is a hub with a mix of private and public institutions occupying the space, sharing research and, one imagines, the best graduates and research outcomes.

This is an academic building structured around facilitating serendipity: chance encounters that lead to fortuitous outcomes. This has long been the goal of research institutions who realised that cellular office layouts were stifling creativity and research output. Here, effort has clearly been taken to support these chance encounters, from easy chairs at the head of stairs to open plan, ad hoc meeting spaces, and shared kitchenettes proudly open plan at the entrance to each floor. Here the architect has employed simple, unglamorous tools that meet its clients’ needs and actively encourage and promote interaction. Even the stair widths seem to have been set to support this – not quite wide enough to ignore the person coming towards you.

While serendipity is a central idea there is also a blurring of boundaries between disciplines and a planned cross-pollination between fields. On first impression The Bayes Centre appears to deliver by expressing the idea in the architectural organisation of the building, with most of the spaces open across the central full-height atrium. While the atrium starts looking rather small in plan at ground floor, by the third floor it opens up and out, top lit and supported by a timber clad, off-the-shelf truss system.

The strongest architectural decision, an idiosyncratic stair traversing the atrium at 90°, came from the client – likening the building to a computer chip where different vertical layers are offset and interconnected to prevent overheating or interference. Here it connects the ‘commercial partners’ on the third floor to the university research hubs and allows a fabulous change in perspective as you rise through the building. The atrium is beautiful in section and enlivened by this straight, dynamic stair.

The phase 1 Informatics building is cellular with rooms off corridors; in the new building these dissolve into wider circulation that in turn washes out into the atrium and open plan work spaces. Here Bennetts has brought its office experience to bear in making the open plan spaces work: the post grad students look like they’re hot desking in tech start-ups and one can sense a hive of activity forming an academic whispering gallery around the building.
The open plan space is concentrated in the middle of the plan to allow offices in the corners with views (especially of the castle and to Arthur’s seat). Project architect Sally Mackay notes that this has become a key attractor for top level academics to come to work in this city, a unique selling point in a fiercely competitive international marketplace.

As ever, photographs can’t express the haptic qualities of the central atrium space, but the sound quality in particular is excellent. There is a relaxed and satisfying heaviness to the space that allows easy conversation and one can imagine it being possible to call across the atrium to offer a cup of tea.

Care and attention has been paid throughout the building; the floor plates and soffit details are beautifully expressed, the concrete appropriate and well executed, and we liked the impressively tall bespoke doors throughout. The architects have clearly enjoyed simple materials and controlled the level of craftsmanship in what was understood to be a tight and closely monitored budget.

The press photos include a corridor with blackboards on which complex maths is being worked out. But this is no ‘Beautiful Mind’-esque trope – the boards are indeed well used and covered with formulae. The writing on the walls extends to the internally glazed

**Site plan**

0 50 100 150m

**Top** Looking west over the courtyard beyond to the University of Edinburgh’s ceremonial McEwan Hall.

**Above** A colonnade directs users from the north corner south to the entrance courtyard.
partitions that are used to meet the fire compartmentation rules without distacting from the scale of the central volume.

While internally the idea of porosity between academic departments is beautifully worked through, externally the building is porous to the city with a walking route connecting diagonally via splayed openings that follow the line of a street lost in the 1950s.

Several seminar and studio spaces have been pushed into glazed courtyard elevations to enliven and express the activity within, and the architect pressed for the café on the ground floor to be publicly accessible. That this has been achieved via the main atrium perhaps limits its success despite a purposeful view into the robotics lab.

Externally, the building is appropriately scaled with a neighbourly facade. The new east entrance is formed via a double height loggia, white terrazzo columns and beautifully executed oak cladding. Sandstone cladding is employed in bands on the street elevations with polished concrete to the internal courtyards.

The vertically proportioned windows reference the proportions of the Georgian city. The windows themselves are by Hansen with relatively narrow frames and brushed stainless ironmongery which look good and open where possible for controlled natural ventilation.

The windows have been detailed to sit flush with the concrete panels to the courtyard for a modern aesthetic, but express the depth of the reveals on the outward facing stone elevations to reflect the mass of the more traditional material. Here the more modestly proportioned windows have been offset with larger areas of curtain walling to open up the public spaces and animate the facade. While I could live without the bar code arrangement that seems to be the lingua franca for large office buildings, at least on the street elevation a more restrained arrangement is employed.

Overall I was struck by a building showing a transition in thinking: from the planners who originally required all existing car parking to be retained in two massive basements, now replaced with bike parking to rival the Netherlands; to the architecture that has moved from cellular office spaces to an open plan layout – expressing the interesting and dynamic cross disciplinary research that goes on here.
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1. **Dualframe 75 Si casement windows**
   Sapa
   The trend for councils to bring recycling services in house may have reached an apotheosis here in Gloucestershire, where Shire Hall's refurbishment includes Sapa's bevelled-profile, internally beaded, DF 75 Si reversible and in/out opening casement windows. Extruded from 100% recycled aluminium, the A+ WER-rated windows dispense with foam thanks to their polyamide thermal break. Now the council plans to take advantage of their 180° reversibility, encouraging office workers to bring the cleaning in house too. Cuts!
   sapabuildingsystem.com/en/uk

2. **Novista Riser door system**
   Aspex UK
   'Oh show me the way to the next whisky bar
   Oh don't ask why
   Oh don't ask why...
   For if we don't find the next whisky bar
   I tell you we must die
   I tell you we must die
   I tell you
   I tell you
   I tell you we must die!'
   There's no chance of unearthing a dram when it's behind one of these nifty Aspex Novista Riser concealed steel doors*; especially when they're three-point locked. What I'd give for a Jack Daniels!
   *Morrison not included
   aspex-uk.co.uk

3. **PURe aluminium windows**
   Senior Architectural Systems
   Worshippers at Brixton's Corpus Christi Church stand before The Lord Their Saviour in penitence for transgression against His Laws. For they have been called to account en masse for surrender to the Sin of Covetousness, whereby they have been driven to picket the neighbouring Lambeth College campus, railing against students for committing the Sin of Greed. Why so? The new building's heat is retained by the thermal barrier in the SAS windows, giving a U-value of 0.73W/m²K and toasty toes for The Educated while The Righteous next door freeze.
   seniorarchitectural.co.uk

4. **Long Cassette doors**
   Door-Stop International
   A dear friend once attempted to remedy his landlord's Rachmanist attempt at eviction by replacing the missing Victorian joinery with stacks of C90 tapes, secured on lengths of piano wire salvaged from the dump at the end of the street. That same dear friend now earns a couple of million a year dealing in wine, and thanks to Door-Stop International's new entrance designs, is proud to announce that he dwells once more behind a (considerably more weatherproof, secure, thermally efficient – and patterned!) selection of long cassettes.
   door-stop.co.uk
I do love a bit of industrial. Not Vitsoe’s mid-century style, but proper industrial, complete with authentic workforce... cute cloth caps, and a high corrective calliper count. So I am in love with Vitsoe’s new Leamington HQ. That VELUX north-facing sawtooth roof is 100% pre-electric, 1000+ lux perfection. Regrettably, the 240 panels’ light-maximising slim frames and integrated actuators will yield 21st century levels of workforce comfort. Also needs more whitewash. And more barefoot children, plus heavy machinery to keep them entertained. So close!

VELUX

It was evidently high risk, hiring an intern fresh from the Cordon Bleu school – but really! Anyone would think we’d stuck La Gaga on the front of the building in her meat dress, rather than an elegant array of appetising (though admittedly wilting) cut vegetables. So what have I learned? Chanterelle can chop a vanishingly fine carrot stick, but she can’t spell. It was a nightmare to attach, too. Ironic, really, that the USP of the CR Laurence Juliette that was actually specified is its ease and versatility of fixing.

CR Laurence

Last time I did a £26,724 471 refurbishment, I was silly enough to leave the joint unlocked. In mere hours, the raggedy ne’er-do-wells were inside and packing all my lovely power tools into their horrible old van. Ireland’s National Gallery is evidently run by bods with more foresight, for they have backed up the rusticated gorgeousness with 30 of ASSA ABLOY’s steel doorsets, rated for not only ballistic and fire purposes, but, ah... security, too. Their panic hardware would also have been handy that night. I know this now.

ASSA ABLOY

Working on getting the balcony ready before Patsy and Nigel arrive for the weekend... three hours rummaging about on Crocus.co.uk was costly but worth it for the impact. Dracaena ‘White Jewel’, 35cm pot, 1.4m tall: £249.99 Howea Forsteriana, 32cm pot, 2m: £299.99 Dypsis Lutescens, 32cm, 1.8m: £279.99 3x Whichford 38cm orange pots: £149.85... Wintergarden slide-and-turn balcony glazing panels from Solarlux: priceless.

Solarlux
Diversity in study

The teachers’ mantra that no two children are the same also applies to school buildings. Architects must maximise the benefit to the pupils, students, staff and site.

Words: Pamela Buxton

You could hardly get a more diverse bunch of education buildings than those featured in the latest PIP education seminar. From a low-rising special needs school in Ballymena to an intensely urban school in a wealthy London borough, and from a coastal arts/education centre to a Stirling Prize nominated teaching pavilion in the landscaped environs of an Oxford college, their differences are clear.

They all, however, demonstrate the extra level of thinking that architects, in collaboration with consultants and manufacturers, can bring to even the most challenging of briefs. So concluded conference chair and PIP editor Jan-Carlos Kucharek, and after listening to the presentations it was difficult to disagree.

Dixon Jones’ Marlborough Primary School in Chelsea, which surely wins the prize for the most challenging site, is indicative of the different ways that new local authority school buildings are now being delivered. Funded via a Section 106 agreement linked to the development of luxury housing, the project also had to incorporate a pedestrian passage and a commercial office development, leaving a meagre footprint of just 80m by 40m to build a school to house a rise in numbers from 300 to 450 pupils.

Dixon Jones’ solution is impressive – a densely stacked building stepping up to five storeys which makes a virtue of necessity by creating a cascade of rooftop terraces for outdoor play and learning. The entirety is realised with careful reference to local architecture including the delightful Michelin Building, which inspired the use of glazed brick with yellow, blue and green accent colours. Not only does the project meet its educational and commercial brief, like the distinctive Victorian school it replaced, it creates a school with a strong civic presence, according to associate director Paul Jolly.

What a contrast in terms of context with Castle Tower School, a special educational needs through-school arranged over one and two storeys around courtyards in Ballymena.
Northern Ireland. Isherwood and Ellis's design used shared central and social concourse facilities to link otherwise unconnected primary and secondary accommodation, with a separate entrance for nursery children and a dedicated post 16 zone within the post-primary block. The architect wisely took charge of the design of the entrance canopy over the important drop-off zone, incorporating the full colour spectrum into the sweeping form to reflect, says architect Arthur Sloan, the school's commitment to inclusivity. Classroom designs are standardized where possible to avoid too much change, which some students would find challenging. There is also easy access to outside 'de-escalation' areas as well as the provision of specialist facilities such as bounce areas, hydrotherapy pools and sensory rooms, plus a climbing wall. Isherwood and Ellis also rose to the challenge of providing stairs in a special needs school, choosing to celebrate them as a wide terrace with two flights of stairs interspersed with seating.

Acoustic control – always vital in any school – is all the more important in a special needs school where uncontrolled noise levels can be upsetting as well as detrimental to academic performance and teachers’ vocal health. Rockwool technical specification manager Justin Lewis described a collaboration with RMA Architects on the National Autistic School in Chigwell, one of its many education sector projects. Here Rockwool installations in the soffits and flat roofs have helped create a calm setting that exceeds BS93 acoustic standards as well as achieving sufficient thermal and fire performance.

Another close manufacturer-architect collaboration, at the Quarterhouse arts and education centre in Folkestone, demonstrates how a bespoke solution can elevate a humble material to the key design feature of a building. Architectural metals and meshes supplier Cadisch MDA fulfilled Alison Brooks Architects’ vision of a screen across the elevation inspired by the translucency of scallop shells. After an exhaustive collaborative process detailing the design, expansion and finish of the mesh, the polyester powder coated mesh was bent over a barrel piece by piece by hand to achieve the required curvature then riveted and welded into frames and installed with particular attention to minimising the fixings.

Niall McLaughlin Architects’ impressive Sultan Nazrin Shah Centre at the University of Oxford's Worcester College, is another highly crafted building, this time in the further education sector. Associate Alastair Crockett described the fascinating process behind the design of the steam-bent oak seating, which has integral fold-down tables discretely incorporated into its backs, and the efforts to marry comfort and functionality with visual purity. We learnt about the radiating, fluted roof over the auditorium, inspired by the folds of a fan and created in glass reinforced gypsum cast from CNC cut moulds, and also the labour of love that went into realising the elegant Clipsham limestone masonry in collaboration with stonemason Szerelmey. This building, nominated for the Stirling Prize, also demonstrates how architects can deftly use new buildings to make better sense of an existing landscape, in this case by extending the lake up to the new building and by creating a clearer relationship with the nearby MJP-designed Sainsbury Building.

All the education buildings featured in this seminar worked hard to maximise the potential of their varied briefs and sites, to the benefit not just of those that use them, but of the wider community around them too. •
In 1852, the V&A's predecessor the South Kensington Museum became the first museum to collect photography. More than a century and a half later, the V&A's new Photography Centre, designed by David Kohn Architects, does full justice to the fascinating collections it has amassed in the intervening years.

Located in the grade I listed first phase of the V&A building, the new space incorporates the original rectangular photography gallery plus an interlinked adjacent parallel gallery. The project doubles the size of available exhibition space and enables the creation of temporary and digital displays including a ‘Dark Tent’ area for projections and events.

While visitors will linger over the attractive displays, the most crucial part of the project is largely unseen – reconditioning the spaces to the highest climate control performance given the extremely sensitive and fragile nature of the historic collections. This involved stripping back and relining the walls and ceiling with insulation to reduce air leakage, and introducing a bespoke ventilation system above the gallery on the museum roof. Where possible, new vents were inserted into existing wall penetrations. Gulleys in the retained wood floor were used for the new electrical supply.

‘The less you can see of what we’ve done, the better we’ve done the job,’ said DKA project architect Jessica Lyons.

Visitors familiar with the gallery before however, will certainly appreciate the increased sense of space, created by removing the partitions that previously punctuated its length to open up a longer vista. With those gone, DKA was able to add what Lyons describes as ‘an ‘undulating landscape’ formed by a family of new mobile display cabinets stretching down the centre of each gallery.

Created from durable powder-coated steel, these were conceived by DKA as miniature houses in their own right that could be reconfigured to suit changing displays. Each incorporates in-case lighting mounted on magnetic strips for easy rearrangement. Wall units were inserted into two former circulation gaps down the dividing gallery wall, their arched form echoing the shape of the lunettes above.

The run of units is also punctuated by highly tactile, chunky oak seating by furniture maker Tom Graham, who also created seating for the digital area.

‘We wanted to use a hard-wearing but quite luxurious material,’ says Lyons, adding that the gallery was expected to last 50 years at least.

DKA collaborated with V&A curators on the layout and background of the display, with temporary displays defined by a yellow background to contrast with the midnight blue of the more permanent displays. This was chosen, says Lyons, to make the photographs feel like ‘jewel-like elements in the space’.

Located beyond the reworked two historic galleries, the ‘Dark Tent’ reads as a clearly
The V&A revives a 150 year old museum landmark with David Kohn Architects’ Photography Centre, bringing an old ‘new technology’ up to date

Words: Pamela Buxton Photographs: Will Pryce

contemporary intervention that continues DKA’s interest in buildings within buildings. Inspired by Karl Friedrich Schinkel’s ‘tent room’ at Charlottenhof Palace at Potsdam, this element cleverly also provides a link between the first architecture of photography in that it is reminiscent of the travelling darkroom field tents of photography pioneers. This is created in shimmering powder-coated steel over a bent plywood base with concertina doors emulating the folds of a tent. Internally, the space is lined in stained plywood.

The new centre’s unshowy but quietly pleasing design allows what’s on the walls to shine, from Julia Margaret Cameron and William Henry Fox Talbot through to Man Ray, Cindy Sherman, Martin Parr and many more. The camera as object is also celebrated, from the fantastic entrance display of 140 cameras spanning the history of photography to the massed ranks of the iconic Brownie cameras inside.

This new space is just the first phase – the second, planned for completion in 2022, will double the space again.

Axometric

1. Entrance to gallery
2. Dark tent
3. Temporary display area
4. Permanent collection

Credits

Architect David Kohn Architects
Structural engineer Arup
M&E consultant Arup
AV consultant Hawthorn
Quantity surveyor Currie & Brown
Project manager Gardiner & Theobald
CDM co-ordinator Currie & Brown
Main contractor ME Construction
Dark Tent specialist sub-contractor 2D 3D
Exhibition cases Florea
Furniture Tom Graham Workshop

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1 ThistlePro PureFinish
British Gypsum

It took 30 plasterers to apply the finishes in this specialist hospital: 40,000m² of Thistle HardWall and 12,000m² of Gypframe ceilings, all coated by hand. But more interesting is that the ThistlePro PureFinish skim coat contains what BG calls ‘ACTIVair Technology’ (but we’re going to call ‘hydrated lime’), deactivating airborne formaldehyde released by synthetics in furniture, carpets and so on, and which has been indicated as a cause of respiratory irritation, anxiety, depression and panic attacks. Lot of fuss, really. The last thing you want in a hospital is sick building syndrome. british-gypsum.com

2 Flowshield SL epoxy floor
Flowcrete

Well! News is that IKEA has stopped using stickers to funnel the ravening gaggle around its display floors – and contrary to rumour, it’s not because of the high maintenance and low flexibility of the adhesive arrow system. No! Rather, it’s because once Flowcrete had finished pouring this seamless epoxy floor for the new Hong Kong branch, HQ high-ups knelt in reverence, weeping at the satiny beauty of it all, and agreed that LED projection was far more respectful of its durable sheen. We’re not in the nineties now, Toto! flowcrete.co.uk

3 Allura Wood LVT luxury vinyl tiles
Forbo

Forbo’s Allura Wood luxury vinyl tiles in ‘Classic Autumn Oak’ were specified for this lawyer’s refit, expressly to create a relaxed ‘home from home’ environment. We actually tried this concept 20 years ago – but must have been so far ahead of the curve that our refurb never really took. I particularly remember the ‘used tissue’ installation around the conference table, the out of date four-pint Duchy full-fat renewed daily in reception, and the dressing gowns arrayed beside the door to welcome visitors. Unlike these guys, we folded within 18 months. forbo.com

4 Stosilent suspended acoustic ceiling
Sto

I lie now here consigned to earthe, My resting place a place whose birthe Was thanks to me, whose Ark of Wonders Brought ye worlde displayes of plunder. My tomb of old, yt ys surrounded now by moderne chambres, Copper-dressed, Wherein Alchemick wonders now impresse: Suspended ceilings, which suppress Ye squeaks of merveille at displayes Whose horticultural treasures stand In testament to this John Tradescant And hys long-distant plant collecting days. sto.com

ribaj.com
Sign Up

Alexander Martin of Alexander Martin Architects picks three of his specification favourites

TAKE DYSON CU BEAM
Designing the lighting for a recent office scheme in a listed building, a challenge of the project was to provide contemporary lighting in an unobtrusive manner. Jake Dyson’s CU Beams were used, with a single fitting illuminating four desks. We were impressed by the quality of the engineering although the ceiling attachment plate could be improved. It worked well where it was used as an uplight, and the ability to adjust the shutter position to direct light and shield glare allowed versatility in positioning of the fitting.
dyson.co.uk

LONDON STONE BLACK PORCELAIN
Finding a mid priced consistent grey/black landscaping finish has not always been simple, particularly where the installation requires slabs to be both ground laid and floating on pedestals, which occurred at the entrance of a house extension. On top of this, clients often want to limit maintenance. The London Stone porcelain range provided the solution here, allowing formats up to 1.2m by 0.6m in just 20mm thickness, while the sandblasted surface finish has a matt appearance with excellent slip resistance which is easy to clean.
londonstone.co.uk

GRAEPELS BESPOKE METAL
At present we are designing a perforated metal staircase and partition panels for an office building in Soho. We’re working with Graepels’ Picture Perf service to deliver the required graphic result, with a good selection of base materials and finishes. The project presents particular challenges and these are being overcome working closely with Graepels. There is no minimum order size so it is possible to incorporate bespoke design features easily on smaller projects.
graepels.com

...Sign Off

Jan-Carlos Kucharek enjoys three of this issue’s out-takes

WATTS OF THE WORLDS
No one would have believed in the early years of the 21st century that Charterhouse School was being watched keenly and closely by intelligences greater than man’s and yet as mortal. With infinite complacency pupils went to and fro beneath this globe, serene in their empire over light fixtures.

No one gave a thought to older worlds of lighting. At most, terrestrial men fancied there might be other light fittings, perhaps inferior to this but just as suitable. Yet across the gulfs of Eric Parry’s office, intellects vast and cool and unsympathetic regarded this gateway with envious eyes, and slowly and surely drew their plans for a gas lamp.

THE CAD SAT ON THE MAT
In the world of architectural visualisation, could life be imitating art? With global e-sports – where champion Korean gamers earn big bucks sat in a room in this world with hundreds of other juddering kids, fighting battles in other worlds – that critical edge could come down to your hardware. Cue mouse pad manufacturer Mad Catz’ GLIDE gaming mat. Of ‘high-density silicon’ and ‘friction-free cloth’, it ensures ‘mice don’t sink into the material during play’, ensuring you take out the zombie and not vice versa. 3D visualisers, under pressure to produce high-spec architectural renderings, should take note. For the slickest visualisations yet, get a GLIDE.

AN APP A DAY
Boaty McBoatface and Brexit showed us never to set our sights too high with the voting public. And media agency Mindshare’s latest online survey sees no change. Asked what our most desired piece of smart home tech would be, did we pick something useful – like a loo pan that analyses your stools, recommends dietary adjustments or books you in for a GP appointment? Or did we pick something fun – like a vacuum cleaner that adjusts rooms to your body temperature (can’t agree!) or a fridge that gives recipe ideas and an app that lets you buy what celebs are wearing on TV IN REAL TIME. Thank you Britain!
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