TIMBER IN ARCHITECTURE

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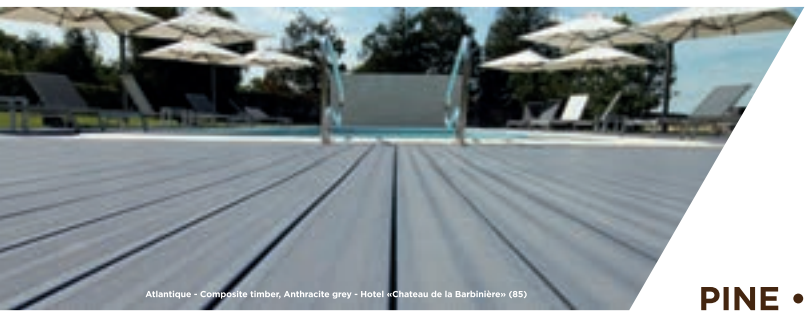
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Timber in Architecture supplement

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FROM THE EDITOR

Sustainable, healthy, beautiful, endlessly forgiving and flexible for building with, what's not to like about wood? While it may not be suitable for absolutely every type of construction, its enduring – and resurgent – popularity is now seeing timber appear in the most unlikely places.

It is now increasingly familiar to see exposed CLT used to span long distances in buildings such as schools, where they can also add a note of warmth throughout – as featured in our report on two Aberdeenshire schools on page 23 of this special supplement. However there are some more surprising and sometimes controversial examples.

In Barangaroo, Sydney, a CLT and glulam office has recently opened which stands six stories high, and is the first major office building built in engineered timber in Australia, and not exactly a common sight elsewhere at this scale. Lendlease's 7000 m^2 International House (architect: Tzannes) is a real statement of intent, and leads the way for other developers across the world looking to provide intrinsically healthy as well as sustainable environments for staff.

As Alex de Rijke of dRMM postulates in his comment piece on page 10 though, the taller timber buildings that are popping up raise questions as to not only whether they are genuinely 'timber' buildings, but also whether their tallness should be celebrated as an end in itself. Just because you can, with timber, he says, doesn't mean you should.

Frank Werling of Metsä Wood on page 9 offers a different perspective, that we can look to timber buildings to quickly provide high quality and energy efficient extra stories on existing buildings, as a means to address our worsening housing crisis.

Are there any other building materials which can be used to so successfully and harmoniously create every single structural element of a healthy and high performing building, plus many other details? I doubt it. However as timber becomes more and more a mainstream medium of choice for many architects and developers, moving far beyond cheap timber frames of the past to high-performance tall buildings, inevitably this brings more questions.

I hope you enjoy this supplement, which not only features some surprising examples of timber architecture, but also several insights on some of the product innovations which are driving success in this sector.

James Parker
Editor

ON THE COVER...

Veolia's new Recycling and Energy Recovery facility in Leeds is a surprising showcase of timber. Read Stephen Cousins' report on the building by achitect Jean-Robert Mazaud on page 13.

Image © Richard J Walls


Command of the Oceans


Maggie's Oldham
© Jasmin Sohi


1 New Burlington Place
© Rob-Parrish

AWARDS

Wood Awards 2017 shortlist announced

A shortlist of 20 structures have been nominated for the Wood Awards 2017, featuring some of Britain's best architectural designs in wood.

The judging panel, led by architect Michael Morrison of Purcell, will visit all the shortlist projects in person, and the winners will be revealed at the annual Wood Awards ceremony at Carpenters' Hall, London on 21 November.

The projects selected for the shortlist demonstrate a wealth of innovative architectural designs that use wood as a primary material. Cross-laminated timber and glulam timber, steam-bent logs, repurposed wood, and timber cut by 'computer numerical' control feature among the many innovative techniques applied to the material across the projects.

Two of the shortlisted projects boast the first ever uses of hardwood CLT within architectural applications.

The competition has grouped buildings into five subcategories. The Commercial & Leisure category includes Command of the Oceans, Historic Dockyard Chatham (Baynes and Mitchell Architects), The Gateway Buildings, Weald and Downland Living Museum, Chichester (ABIR Architects), Hastings Pier (dRMM), Rievaulx Abbey Visitor Centre & Museum (Simpson & Brown).

The Education & Public Sector category shortlist includes Cowan Court, Cambridge (6a architects), GlaxoSmithKline Carbon Neutral Laboratories for Sustainable Chemistry, Nottingham (Fairhursts Design Group), Maggie's Oldham (dRMM), which will be reported on in detail in the November issue of ADF and Wells Cathedral School, Wells (Eric Parry Architects).

The shortlist for the 'Interiors' category includes 1 New Burlington Place, London (Allford Hall Monaghan Morris), House in Devon, Dartmouth (6a architects), Nautilus, London (architect Hassan Nourbakhsh, Borheh), Oak Lined House, London (Knox Bhavan Architects).

The 'Private' category includes four shortlisted entries: The Crow's Nest, Dorset (AR Design Studio), Hampshire Passivhaus, Hampshire (Ruth Butler Architects), Stepping Stone House, Maidenhead (Hamish and Lyons), and Woodman's Treehouse, West Dorset (Brownlie Ernst and Marks Limited).

Lastly, the Small Projects award also has four entries: Belarussian Memorial Chapel, London (Spheron Architects), Feilden Fowles Studio, London (Feilden Fowles Architects), Saw-mill Shelter, Beaminster (Architectural Association Design and Make students), The Smile, Chelsea College of Arts, London (Alison Brooks Architects).

SCULPTURE

Joseph Walsh unveils Magnus Modus sculpture

Irish studio workshop Joseph Walsh Studio has unveiled its latest commission, a 7 metre tall sculpture made of multiple layers of laminated olive ash wood that will be joining the National Gallery of Ireland's permanent collection.

Magnus Modus, currently displayed in the gallery's courtyard, is the latest addition to the Magnus Series, which "challenges the perception that function demands an explicit use," commented Joseph Walsh, founder of Joseph Walsh Studio.

Assembled and designed in a large warehouse, the curved sculpture was commissioned by the Office of Public Works (OPW) on behalf of the National Gallery of Ireland under the Per Cent for Art Scheme as a result of winning an invite-only competition staged by the OPW.

According to Walsh, the sculpture "responds to whether art can transcend history while also addressing the relationship between form and function." He added: "Magnus Modus is the culmination of all the pieces created during the past 15 years and the inspiration that went into designing them. This commission gave me the opportunity to explore ideas around pure sculpture and translate them into a full scale piece.

"It is the very reflection of my search for effortless design harmony."

TIMBER INSTALLATION

House 2 harbours creative collaboration in Zurich

A 240 m² pre-fabricated wooden public installation situated next to the Toni Areal school in Zurich.

House 2 – Counter City is a product of an experimental format for collaborative design and construction conceived by ALICE (Atelier de la Conception de l'Espace) and led by Dieter Dietz at the École Polytechnique Fédérale de Lausanne.

Erected in less than 10 days, the project involved 200 first-year students who prefabricated all the built elements of the installation in Lausanne, transporting them across Switzerland to Zurich for assembly.

The installation is a result of various different architectural contributions. Each offers an approach to "spatial appropriation" through a "dialogical process questioning the quality of public life in view of urban globalisation".

To foster civic engagement, ALICE, in collaboration with the Zurich University of the Arts (ZHdK) curated a series of events for summer 2017 to take place within and around the installation. These included guided tours, performances, sound installations, symposia, student critiques and exhibitions, and film viewings.

Dieter Dietz commented: "through these activities, House 2 expands the practice of collaboration into the public sphere of the city. As a forum installation, it provides a space for active exchange, debate and discussion involving the entire community."

STUDENT COMPETITION

TRADA at Timber Expo 2017

The winning designs in Trada's 2017 student design competition 'CO2nnect' will be able to be viewed on TRADA's stand – T260 – at Timber Expo (10-12 October, NEC).

First prize went to a team from the University of Edinburgh, scooping £2000 for 'Gateway', a modular design that uses a series of reconfigurable hexagonal shapes.

TRADA's latest book, 'Cross-Laminated Timber: Design and Performance, a definitive guide to CLT' will be available to purchase at the show. Also available will be a diverse range of free Wood Information Sheets, Case Studies and Learning Resources, covering all aspects of timber design and build.

Entwined, an innovative timber pavilion will also be on display on the stand. Designed by students from the Emergent Technologies and Design Programme at the Architectural Association School of Architecture, co-ordinated by TRADA and sponsored by Hanson Plywood, this creation derives from extensive research on plywood composite material systems. It focuses on the integration of doubly curved plywood forms and tensile cables.

Attendees to the Timber Focus Theatre can claim CPD points by registering for their certificate at stand T150.

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AWARDS

Awards celebrate excellence in structural timber

The Structural Timber Awards will be held at the NEC Birmingham on 10 October alongside Timber Expo, celebrating "innovation, best practice and expertise in timber technology," said the organisers.

The Awards will showcase innovative solutions and ground-breaking developments from across the UK timber industry, the shortlist having been selected from over 200 entries. Each of the judges shortlisted projects in a group of categories, with there being 17 categories in total. The categories include project awards for Social Housing, Private Housing, Custom & Self Build, Healthcare, Commercial, Retail & Leisure, and Low Energy, as well as the Project Innovation Award, Project of the Year, and Architect of the Year.

The awards will be presented to the winners at a dinner which will be attended by 600 "national business leaders and high profile decision makers" from the construction industry.

The Judges' Choice Award in 2016 went to Sarah Wigglesworth Architects for Mellor School in Cheshire (pictured).

Andrew Carpenter, chief executive of the Structural Timber Association commented on the 2016 awards: "It is truly inspiring to see so much activity in the sector and to witness so many boundaries being pushed. The depth of expertise across all categories was impressive."

The list of 2017 finalists can be viewed at www.structuraltimberawards.co.uk/2017-finalists

BRAZIL

São Paulo explores CLT mixed-use

The city of São Paulo is soon to become home to a construction made completely of CLT from Brazilian wood.

The project, spawned from an initiative by Brazilian forest management company Amata, was designed by Triptyque, the Franco-Brazilian architectural firm.

The Amata Building is to be built on a site measuring 1,025 m² in the Vila Madalena neighbourhood forming a total floor space area of 4,700 m². The mixed-use concept towers at 13 stories high and will house co-working, co-living plus restaurant spaces.

The project's structure will consist of cross-laminated timber (CLT) panels, a product whose structural properties allow it to be used as a structural material for high-rise buildings. Every 40 hours the AMATA's forests grow enough timber to build up to a 10-storey CLT building.

For every 1 m³ of reforested wood one metric ton of atmospheric CO_2 is absorbed from the atmosphere. As a result of this project Brazil will be closer to honouring its pledge at the 21st Climate Conference (COP 21) 2015 in Paris, where it promised to replant 12 million hectares of forest and reduce greenhouse gas emissions by 43 per cent before 2030.

Dario Guarita Neto, who is co-founder and CEO at Amata, said: "Wooden framed buildings are an efficient solution and may serve as a boost toward a change in the environmental consciousness of our societies because, as we replace non-renewable resources with natural raw materials, we also help create a cleaner production chain, adding value to certified forests. This can, in turn, lower the pressure of deforestation."

GLAMPING IT UP

Sky Hut from WG+P Architects gazes at the stars

WG+P Architects (Waind Gohil + Potter) in collaboration with Webb Yates Structural Engineers, have won a design competition with their new glamping cabin, the Sky Hut, inspired by traditional Welsh myths and stargazing.

The firm's winning entry is timber clad with a retractable roof so campers can gaze out into the Welsh night sky, thanks to a simple geared cable system borrowed from sailing technology.

With the doors open, the Sky Hut can be configured as an observatory. Upon the turn of a crank handle, it quickly closes again forming a retreat, with eye level glazing giving 360° views.

The Sky Hut is made using Welsh sourced timber structure insulated with unprocessed sheep's wool, while sinusoidal metal sheet cladding acknowledges Wales' role in industry. All materials are carefully detailed and chosen for their durability and economy.

The competition was staged by Epic Retreats, a partnership between Best of Wales, Cambria Tours and George + Tomos Architects and partially funded by the Welsh Government's Tourism Product Innovation Fund.

COMMENT

Rising to the challenges of urban construction

Frank Werling of Metsä Wood examines the possibilities of using timber to help solve the housing crisis in major UK cities

Mass urbanisation is one of the most significant issues facing humanity today. By 2050 two thirds of the world's population will live in cities. Consequently, urban growth is outpacing the ability to build affordable and sustainable living spaces.

Cities all over the world are in dire need of new ways to house a rapidly growing urban population. Nowhere is this more evident than in our capital city, where space is at a premium and housing the ever-growing population continues to pose a huge challenge.

London is at the peak of a housing crisis with the Greater London Authority (GLA) forecasting that the city will require 60,000 new homes a year (around double the current rate) to meet new projections. Innovation in building methods and materials is required for house building in urban areas to hit these targets, while ensuring fast and sustainable construction.

One obvious, yet often overlooked solution is to start building up, and stop tearing down. Using new modern timber enables several stories to be constructed on top of existing structures. A building extension constructed with a timber frame can be a fast, sustainable and inexpensive solution.

Research from the GLA shows that approximately a quarter of existing buildings are strong enough to carry additional floors made of wood. This makes wood a highly promising building material for providing living space for billions of people – while also preserving the architectural heritage of our cities.

One of the other main considerations for considering timber in urban construction is energy efficiency, not only during the construction process but also for the lifetime of the building. This is extremely important in London as it currently has a target of a 60 per cent reduction in carbon emissions by 2025 as part of the Climate Change Mitigation and Energy Strategy. According to the GLA homes and workplaces currently account for 78 per cent of CO_2 emissions in London while 80 per cent of the existing housing stock is likely to still be in place by 2025. In light of this, it is essential to improve the energy performance of new builds in order to cut costs and carbon.

As part of a project to explore the various possibilities of building with wood, Metsä Wood offers detailed examples of how to build recognisable, but modern versions of well known architectural buildings, such as the Empire State Building using wood as the main material. The models have been exhibited at trade shows across the globe and have helped to raise awareness, challenge conceptions and spark debate around modern timber construction.

Research from the GLA shows that around a quarter of existing buildings are strong enough to carry additional floors made of wood

The project is just one example of how innovative design is challenging the perception of what is possible in urban construction. It is now becoming more widely acknowledged that timber products have a major role to play in building cities of the future using fast, light and green materials.

Further information, including a full list of competition entries, can be found on the Metsä Wood website, at the following URL: www.metsawood.com/planb

Frank Werling is head of technical, engineering and design at Metsä Wood

COMMENT

Height isn't everything

Alex de Rijke of drMM says that while architects are exploiting the possibilities of timber to build tall, this should not reinforce a view of towers as the answer to urban density, and it's unrealistic to expect them to be true timber buildings.

Why do architects want to build high - specially in timber? Like testosterone-fuelled explorers driven to go further, the challenge is apparently irresistible. The biggest erection wins the global reputation, the research stakes, the media interest, the TED talk and the necessarily short-lived title of the 'World's Tallest Timber Tower'.

At dRMM Architects we pioneered engineered timber architecture in the EU, exhibiting the first cross-laminated flatpack prototype house in Oslo in 2006, and realising state school buildings from 2007. In 2009 the practice proposed a 6000 seat Handball Arena for the 2012 London Olympics, and a 10 storey all-timber apartment building design to developer Lend Lease for the Athlete's Village. This, also ahead of its time, was in the event built in concrete frame, but LendLease went on to build the 10-storey Forte CLT tower in Melbourne in 2014. In 2008, dRMM, collaborating with Norwegian practice Helen & Hard Architects proposed 14-storey timber towers near Stavanger, Norway. These (pictured above) were designed as all-timber structures but eventually built in 2014 as a concrete and timber hybrid.

The design intentions are laudably grounded in global environmentalism, but the outcome is ironically the language of steel frame construction

How high is high, when it comes to timber? Although unbuilt proposals compete for the title, including PLP's 80-storey 'toothpick' designed for a site in London in 2016 via Cambridge University, in 2017 the world's 'tallest timber tower' built is Brock Commons Tallwood House by Acton Ostry Architects for the University of British Columbia. This uses the CREE concrete and timber with steel connector system devised by Hermann Kaufman and Arup. At 17 storeys, the first floor and cores are concrete and the wood above not visible as it is covered in drywall. The design intentions are laudably grounded in global environmentalism, but the outcome is ironically the language of steel frame construction, like 1960s Mies van de Rohe buildings now constructed in wood.

The sky's the limit for the fast evolving world of modern timber construction techniques, and the architectonic expression of 'new' materials and forms remains underexplored. The relevant question is not how high can you go, but do you really need towers to achieve urban density? And if so, at what height does it stop making sense to use 100 per cent timber? The absurdity of structural perversity is the actual limit for timber construction. It is worth noting that the tallest trees (Californian Redwoods) are beautifully resolved structures, and rarely grow higher than 100 metres, circa 33 storeys.

For 20 years I have been advocating laminated timber's outstanding versatility, weight to strength performance, sustainability, speed and limitless expression. Together with Arup and the American Hardwood Export Council, dRMM have invented and tested cross laminated hardwood; the 2013 Endless Stair installation was specifically created to demonstrate engineered timber's massive potential for the 21st century construction industry. In 2017 we completed the first building using hardwood CLT, Maggie's Oldham (which will be featured in depth in November's ADF). This project showcases structural exposed tulipwood CLT, timber insulation, and a specially designed thermally modified external cladding, also tulipwood. The reason for inventing sustainable hardwood CLT was that it is lighter, stronger and more beautiful.

As a timber architecture specialist I hesitate to advocate very tall all-timber structures for the sake of simply being higher, or to pretend that what are inevitably hybrid structures are actually 'timber' towers. Concrete, steel, glue and glass are always essential parts of the design; what is important is the ratios. To build 30-plus storeys high in 100 per cent timber, and whether as a frame or mass wood construction, currently means using more timber than is efficient; the top-down progressive loads mean that the lower levels of the tower would literally be a forest of wood.

The considered answer to this century's architecture is not the 'tallest timber tower' but clever composite structures as well as new high density 6-12 storey building typologies; i.e. how you make sustainable cities. Mixing in but reducing steel and concrete to the absolute minimum, whilst exploiting timber's unique ability to invert the construction industry paradigm for carbon production, pollution and waste, is the desired future.

Alex de Rijke is a founding director of architects dRMM and has overseen concept, construction of delivery including the 2017 Stirling Prize shortlisted Hastings Pier, Maggie's Oldham, Tower of Love in Blackpool, and Rundeskogen in Norway.

(Shown above) Development located at Thankerton near Biggar, South Lanarks. Installed Howarth Storvik timber windows finished in Buttermilk. High Performance Door Sets and **MAXI**VIEW Sliding Folding Doors. These have enhanced the project to give a beautifully finished home. Photograph courtesy of Design and Materials Ltd.

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BUILDING
PROJECTS

VEOLIA RECYCLING AND ENERGY RECOVERY FACILITY LEEDS

Overarching ambition

Giant arched timber columns and what's thought to be the largest green wall in Europe signal the sustainability credentials of a striking new energy-from-waste facility in Leeds. Stephen Cousins reports

A vast 42 metre-high, 123 metre-long wall of vegetation is the not the first thing you expect to see on an out of town industrial estate, and certainly not the side of a power station, but that is precisely the sight that greets visitors to the new Recycling and Energy Recovery Facility (RERF) in Leeds.

The green wall is a key sustainable element of the 12,000 m^2 building, designed by French architects S'pace for Veolia Environmental Services, Leeds City Council's waste management partner, which will operate the facility under a 25-year PFI contract.

The plant will process around 214,000 tonnes of this waste a year, and features an arc-shaped wooden frame, the tallest of its type in the UK, constructed entirely from giant 'ribs' of glulam timber.

The wall was conceived as habitat for birds, animals and insects, and represents the ambitions of a local city council keen to transform public perception of energy-to-waste facilities, which are typically considered undesirable additions to neighbourhoods.


© Chris George


© Chris George

The wall was conceived as a habitat for birds, animals and insects

Jean Robert Mazaud, president of S'pace, tells ADF: "The first time I arrived on site, all I could see was a huge parking lot, but sprouting up between the various concrete surfaces were small amounts of grass and flowers." It was a demonstration

AMBITIONS
The Leeds facility represents the culmination of many of the ideas of architect Jean Robert-Mazaud

of how nature is resistant to the stupid actions of humans." The wall of vegetation is said to symbolize how people can protect our living environment, "because a dead environment does not need protecting."

A passionate French architect, Mazaud has been designing industrial plants for the past 35 years, 10 of which have been located in the UK. The Leeds facility represents the culmination of many of his ideas, and in many ways is his most ambitious to date. He adds: "I believe we must show in industrial buildings that we are sustainable, planet-orientated and strive to maintain and protect the living environment. We have no choice in this, if a client says they don't want to go down that route I just quit."

Ambitious targets

The RERF is located on the Cross Green industrial estate, around five kilometres south east of the city centre. It was constructed by main contractor Clugston and French waste energy specialist CNIM.

The facility will mostly target household bin waste, processing around 214,000 tonnes of material and generating up to 15 MW of electricity for the national grid each year, plus combined heat and power for local businesses. It is also forecast to recover around 16,000 tonnes of recyclable material, removed using specialist machinery.

The facility forms an important part of the council's 20-year Integrated Waste Strategy, launched in 2005, which targets a minimum 55 per cent reduction in waste by 2016, rising to 60 per cent in the longer term.

Before this project, all of the city's residual waste was sent to landfill, a costly process made more costly by rising landfill taxes that were pushing up costs

by around £1.5m per year. Construction of the RERF is targeted to save the council £200m by 2040.

The plant comprises three connected buildings, a mechanical pre-treatment hall, a main energy recovery facility and an ash storage facility.

Waste first passes through the pre-treatment hall, where materials, such as plastic, cardboard, ferrous and non-ferrous metals are removed for recycling, and non-recyclable materials are carried via conveyor into the main facility. Here they are incinerated to produce steam to drive turbines and generate enough electricity to power up to 20,000 homes. Ash, a byproduct of the energy generation process, is kept in a dedicated storage building before being taken away for recycling.

"Each phase uses space completely differently, which generated three differently shaped volumes," says Mazaud. "The first has a huge flat surface, the second a high and narrow volume, the third a pyramidal volume."

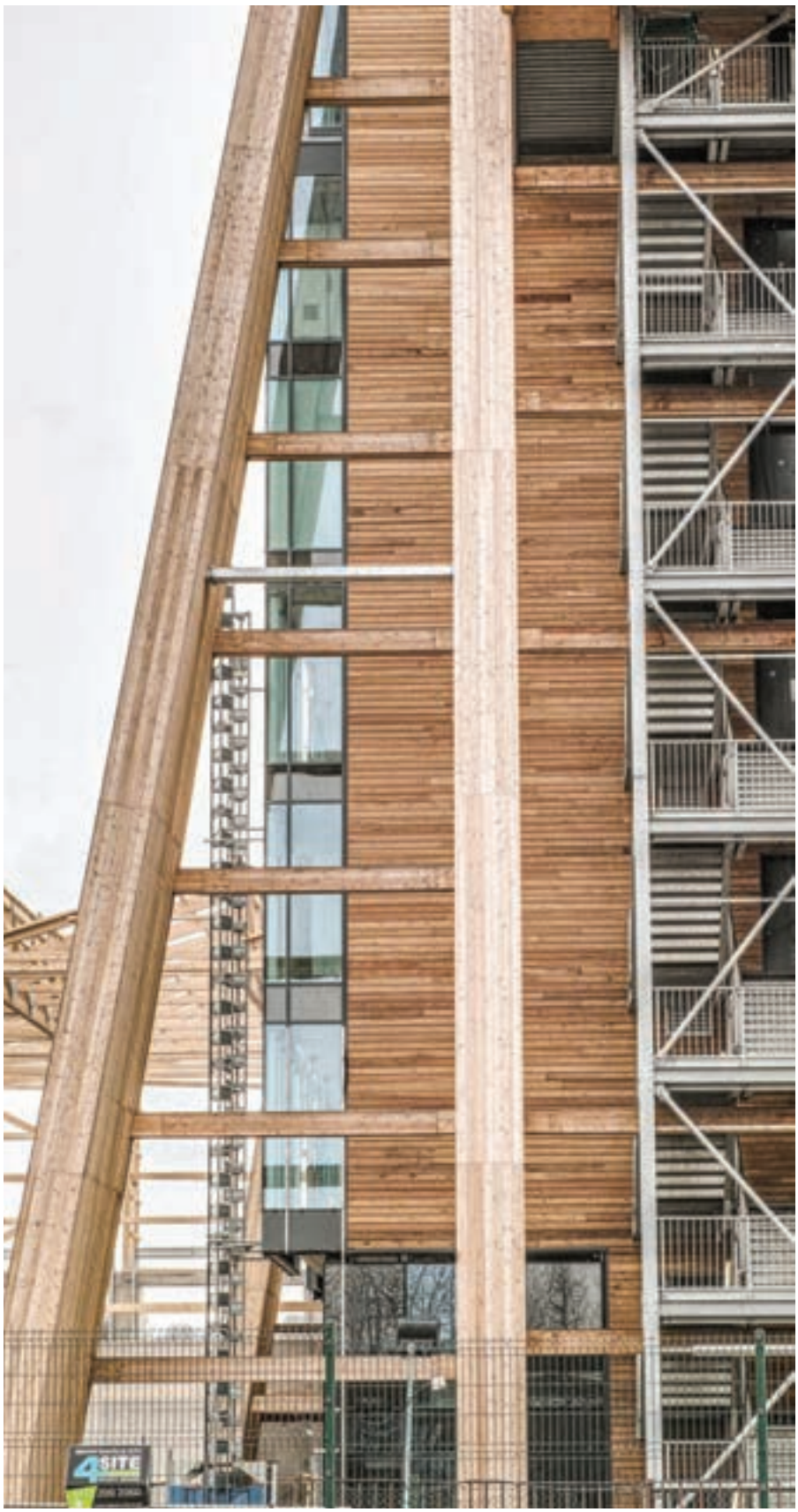
Giant timbers

The main facility is instantly recognisable for its chunky timber superstructure, comprising 20 load-bearing glulam arches designed to fully envelop the processing equipment inside.

Mazaud comments: "The building had to be tall because of the arrangement of the industrial equipment inside. The furnace burns such a large quantity of waste that a large space is required to stabilise the process and cool the air with air-cooled condensers, at the east end of the building, before it is rejected."

The use of 42 metre-long glulam timbers is not unusual in construction, what is unusual is to erect them vertically,

The use of 42 metre-long glulam timbers is not unusual in construction, what is unusual is to erect them vertically



even though this orientation is fairly straight forward to achieve using existing technology.

A total 2,600 m^3 of glulam was supplied, assembled on site by German timber specialist Hess Timber – whose recent work includes the D1 tower in Dubai – and the Museum of Foundation Louis Vuitton, in Paris. Each column is curved at the top and has a cross section of 400 mm x 760 mm.

Before this project, all of the city's residual waste was sent to landfill

Engineered timber is very robust and lightweight, recyclable and energy efficient and it worked out cheaper and faster to install than steel or concrete alternatives. In the event of a fire, the timber would (counter-intuitively) burn slowly remaining self-supporting for many hours compared to steel, which transforms and twists relatively quickly.

"The client was initially adamant there should be no wood, but its strong performance in a fire turned out to be one of the arguments I used to persuade them it was the right choice for the project," says Mazaud, whose fascination with wood goes back to his childhood growing up in a forest where his family ran a saw mill.

A timber frame was also used for the ash storage building, a 12 metre-tall half-dome shaped structure covered by sedum roof.

The arched frame of the main facility is clad in translucent polycarbonate cladding, on its north face, the south elevation is covered by the 1,800 m^2 green wall, which runs in vertical strips between the giant timber columns.

The green wall was designed and installed by UK-based firm Biotecture and will provide a live habitat for all types of insects, birds and other animals. It is inaccessible to humans which should help protect the wildlife from being disturbed or accidentally killed by gardeners or maintenance engineers.

The vegetation is fed using a hydroponic spray irrigation system with intelligent water management. According to Biotecture, the system offers great resilience and fast installation, because most of the work, such as 'pre-growing' the walls, is carried out off-site, giving an instant

visual impact as the panels are planted with semi-mature plants.

Staying grounded

Such a high level of sustainable design is unusual for an energy-from-waste plant and S'Pace faced challenges trying to convince project stakeholders, whose focus is normally on functionality and cost, that it was the right direction to take.

The project was also subject to a sustained campaign from locals and other organisations, and received 300 formal objections during the planning process.

As a result, Mazaud and the design team met with Leeds City Council's design committee up to 12 times a month to explain the design and provide various guarantees that the project would succeed.

"This is a very special and unusual way to control the design of an industrial facility," he says. "The committee was very tough and wanted to check every single detail before signing on the dotted line – they needed reassurances regarding the use of wood, that the traffic around the plant would be under control, that there would be no smell or noise – they wanted guarantees on every single aspect."

However, the architect saw this high level of scrutiny as a benefit rather than an obstacle, he adds: "It was crucial and provided the best support possible to convince my client, who attended every meeting, that they had to be able to satisfy these people, otherwise there was no project, no contract, and no profit."

The facility officially opened in November and, despite some early teething problems with equipment and processing that have caused it to fall short of recycling targets, serves as an important benchmark for how to build greener, more socially sustainable power plants in the future. ■

CHALLENGES
The architects faced challenges trying to convince project stakeholders
Images courtesy of S'pace

PROJECT TEAM

Client: Leeds City Council / Veolia Environmental Services
Architect: S'pace
Main contractor: Clugston Construction / CNIM joint venture
Main contract value: £47m
Concrete supplier: Hope Construction Materials
Cladding subcontractor: FK Group
Glulam timber frame manufacturer: Hess

BUILDING PROJECTS

SKY CENTRAL
OSTERLEY, LONDON

Sky opens up to timber

Media behemoth Sky's marketing tag is 'believe in better', so expectations were high for the design of its flagship HQ building. Ray Philpott finds out if it lives up to the hype

Sky Central in Osterley, Middlesex, is an impressive building that successfully combines two distinct but equally effective design aesthetics.

From the outside it is a large, striking and elegant silver aluminium and glass envelope, a calm, sophisticated and slick reinterpretation of an industrial warehouse. Step inside PLP and AL_A's building and you are struck by a large, open, busy space with a light-filled, with a three storey high atrium at its centre, giving off a real buzz.

The building's expansive interior, large areas of timber roof structure, oak flooring and wooden staircases have a distinctly warmer feel than its glossy and cool envelope would indicate.

At ground level a busy circulation area, known as 'Sky Street', runs east to west for 100 metres. From there a whole range of facilities can be accessed, including six cafes and restaurants, a dry cleaner, postal services, shoe repairs, a cashless Little Waitrose supermarket, and a 200-seat cinema with a state of the art sound system. Informal and large meeting areas plus a major open event space have been created in column-free areas.

A series of 'neighbourhoods' – team-based work spaces for up to 200 people –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The concept sought to generate a bright, open space promoting visibility and movement, a place where people could easily interact

surround the atrium, all but one on the first and second floors. These neighbourhoods offer wide vistas where workers can see 'hub' activity or look across at each other.

Glass-sided lift shafts and exposed ramps and staircases located on the outer edges of the broadly H-shaped atrium link all three floors together, and have been carefully designed and positioned to reinforce the feeling of space and light.

A series of stacked, floating mezzanines, set slightly below normal floor level, serve as 'breakout' areas and connection points for the lifts and stairs.

Presiding over all of this is the Sky News Studio, a large transparent glass box on the second floor above Sky Street, where presenters can be watched broadcasting live news as people go about their work. Clearly, this is not a typical office.

Concept

Launched in 2016, Sky Central is the largest building to be added to Sky Campus, the UK-based broadcasting giant's headquarters complex in the West London suburb of Osterley.

While architect AL_A was responsible for planning and the overall external concept, PLP Architecture was appointed by Sky as the interior design and executing architect in 2013 with a brief to "reimagine" the interior of the building.

"Sky wanted something game-changing and intuitive," explains PLP director Cindy Lau. "Our design needed to support a wide range of agile working styles and the evolving structures of teams, stimulate collaboration and encourage chance, unexpected interactions between people. Sky also wanted the building to support employees' wellbeing."

PLP responded with an internal architectural design promoting flexible and collaborative workspaces by creating 11 distinct neighbourhoods around a central hub linked by the mezzanines. At the same time the concept sought to generate a bright, open space promoting visibility and movement, a place where people could easily interact.

To achieve this, the architects felt some changes were required to aspects of the design concept, primarily the roof and circulation areas.

Lau comments: "The original design was intended to be read as a shed with a floor to ceiling space that created a sense of light and openness. We decided to take that a step further."

Industrial chic

Building on their experience of office projects in the City and working closely with structural engineers Arup, the architects redesigned the roof to create greater concentrations and quantities of skylights bringing in more light, and amendments were made to the recessed glazing in the external walls.

While timber was always part of the original roof concept, PLP accentuated its use, employing 1.3 metre deep spruce glulam-beams up to 21 metres long and spaced 3 metres apart to support a prefabricated timber cassette roof deck. This structural approach opens out – and reduces the density of – one of the largest timber roofs in Europe, enabling increased use of glazing.

The dimensions of the floor plate were also revisited and the atrium reconfigured into a single large central area that spatially feels more open without losing floor space.

Structurally, the building is built around a concrete frame on a 9 metres by 10.5 metres and 9 metre by 9 metre grid, stabilised by six evenly placed concrete cores. The design shifted circulation services out of the cores and into the atrium, enabling the architects to regain some internal floor area.

"Moving the stairs and glazed lift shafts into the atrium created a vertical circulation area connected by mezzanines and made them highly visible architectural features to be celebrated," Lau points out. "When you arrive there's a sense of movement and animation created by a combination of people's activities and the mechanics and inner workings of the lifts and services on show."

Lau continues: "The mezzanines and circulation areas are designed in an architectural language of industrial chic Sky wanted, separating them from the concrete superstructure."

"Everything within the atrium is of lightweight construction, much of it prefabricated off-site. We made extensive use of timber framing, architectural steel and oak flooring. For example, we used

those materials on the stairs and on the mezzanines, while a structural timber frame runs across the whole width with oak flooring on top in place of more typical concrete decking."

Wiring, ducting and other services are deliberately on view as part of what Lau describes as the "honest design ethos". Crucially however, the architects worked closely with the engineers to carefully plan and implement the building's lighting and other essential systems so service installations on show are visually balanced, not random and potentially unsightly by-products.

Flexibility

Externally, the long exterior of building is broken up by a series of 1 metre-deep reveals holding the glazed elements incorporated to add interest to the overall facade reading and providing passive shading to the windows. Sky wanted its exterior to share a similar architectural palette applied to other recently completed buildings on its campus; the Believe in Better Building, The Hub and Sky Studios all feature silver-coloured finishes.

However, the interior design of Sky Central isn't required to follow the other facilities. Nevertheless, bearing the future in mind, PLP chose a limited colour palette, primarily utilising neutral white and grey along with timber tones.

"We believe architecture should stand the test of time and this building offers clients the flexibility to change things later on," points out project lead and PLP Director Wayne McKiernan.

PLP's 200-person 'neighbourhood' concept also offers the flexibility needed for the kind of agile working Sky favours. At full capacity there's only enough desk space for 70 per cent of the 3,500 working there, and no-one has a personal desk.

McKiernan says: "Each neighbourhood is self-sufficient but sharing two 'home zones' with its adjacent neighbours. The Home Zone is an on-floor kitchen for preparing drinks and food, bringing a human touch, and acting as familiar landmarks within the very large floor plates."

They share a range of common elements, including: breakout areas; formal meeting rooms and open meeting areas; plus quiet, standard and larger 'shared' desking types.

In helping create the work environment PLP liaised initially with Sky's own work space team, and later with experts from specialist in the sector Hassell to configure

AGILE
PLP responded with an internal architectural design that promotes flexible and collaborative workspaces, by creating 11 distinct 'neighbourhoods' around a hub

SKY CENTRAL IN NUMBERS

- 3,500 employees
- 5,000 work places
- 165 m x 100 m footprint
- 3 floors
- 5.5 m floor-to-ceiling heights
- 22 m high overall
- 100 m internal 'street'
- 18 internal 'neighbourhoods' created
- 6 km of glulam beams
- 400 triple-glazed skylights in roof
- 45,000 m^2 of work and amenity space
- 200-seat cinema
- First UK cashless supermarket


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NEIGHBOURHOODS
The 'neighbourhoods' share a range of common elements including breakout areas, formal meeting rooms and open meeting areas, plus quiet, standard and larger shared desking

The structure's been awarded a BREEAM Excellent rating but the client has endeavoured to exceed that standard where possible

the work spaces, particularly regarding how the common elements are positioned and interact with the internal architecture and services.

Again, the grey, white and timber palette is applied across the neighbourhoods, along with other common features such as timber flooring, black steel frames to demarcate open areas and wall tiles for the breakout areas.

"Although the appearance of common elements vary slightly between neighbourhoods, Sky wanted each neighbourhood to be broadly similar, not designed around a specific team.

"That way if an individual moves, or a team changes neighbourhood, familiarity is maintained and transitional confusion minimised," explains McKiernan.

Sustainability

Being keen on sustainability, Sky drove significant use of timber and extensive internal planting involving some 27,000 plants.

The structure's been awarded a BREEAM Excellent rating but the company has endeavoured to exceed that standard where possible. It utilises a highly efficient thermal model combining fabric design and an internal system selection which aims to reduce overall carbon emission by up to 40 per cent better than current legislation.

Some 1400 highly efficient PV panels have been installed across the roof, generating power, while triple glazed north-facing skylights with low-e side glazing, combined with passive internal shading form the glulam beams, help to reduce solar gain.

Rewarding

Reflecting on the project, Wayne McKiernan comments: "We had a very tight two-year window to design and complete the project after our appointment in 2013.

"So we were carrying out the design with construction already in progress, which was pretty challenging but thanks to a combination of our experience and great, established working relationships with the engineers and Sky's team, we achieved the project's ambitions.

"Sky were extremely encouraging and allowed us to break away from the design of a typical office building – we had the freedom to create a truly ground-breaking work environment.

"Ultimately we've created a building with the kind of inner space you just wouldn't expect from outside. When you walk in and see live broadcasting taking place right in front of you, surprise and excitement grabs you straight away. That's very rewarding for a visitor and leaves a lasting memory." ■

PROJECT FACTFILE

Concept architect: AL_A
Interior design & executing Architect: PLP Architecture
Workspace designer: Hassell
Engineering: Arup
Main contractor: Mace
Steelwork: CMF / Bourne
Cladding: Prater
Lifts: Otis (Enclosure by CMF)
Glazing: Interpane with Schueco frames

BUILDING
PROJECTS

MIDMILL & TURRIFF PRIMARY SCHOOLS ABERDEENSHIRE

Taking your kit to school

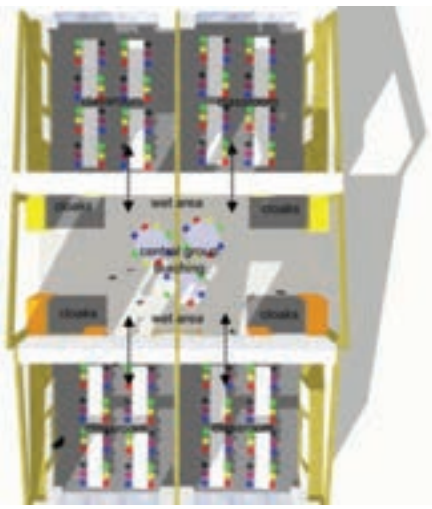
Two of five new schools being provided for Aberdeenshire feature the extensive use of a hybrid glulam and CLT system and a 'kit of parts' approach, leading to a range of benefits for flexible learning environments. Eve Dennehy reports for ADF

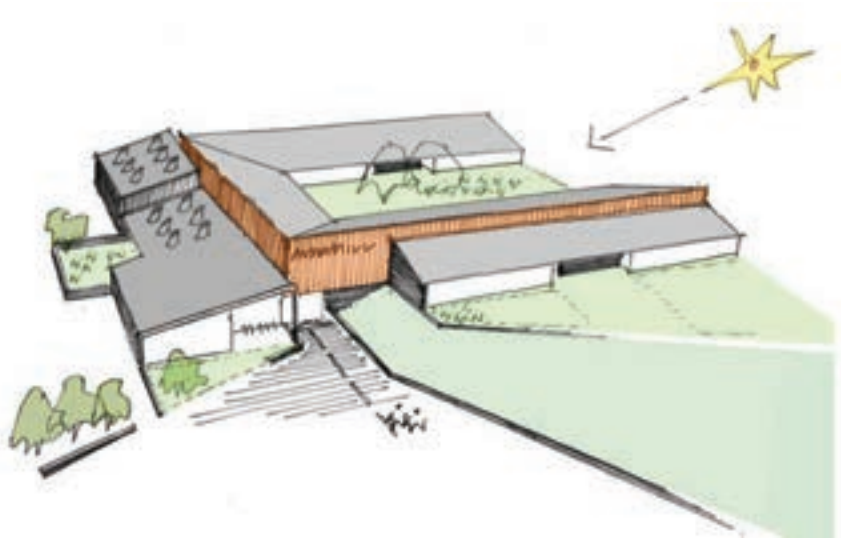
In April 2012 Aberdeenshire Council approved a brief to inform the delivery of five new primary schools – namely Midmill in Kintore, Turriff, Drumoak, Hillside in Portlethen and Uryside in Inverurie. The schools have been funded directly by Aberdeenshire Council's Capital Plan and were traditionally procured to ensure the authority maintained a tight control on quality. The construction work was tendered via Aberdeenshire Council's Main Contractors Framework Agreement. Morrison Construction was awarded the contract to build Midmill, Turriff and Uryside Schools. Hillside and Drumoak Schools were awarded to FM Construction and Robertson Construction respectively.

Aberdeenshire's brief focuses on creating educational spaces which encourage accessibility and social development as part of the curriculum, with natural light, flexible space, transparency for ease of management, and direct links to the outdoors as key design elements. The five standalone schools, which are similar in size and scale, have been delivered within a five-year timescale between 2012-17. This gave the council just two and a half years from approval of the brief before the first project started on site, with commencement on site of subsequent schools scheduled for every six months. The two final schools – Turriff and Uryside – are nearing completion, with both due for occupation by the end of 2017.

Each school has been individually designed by separate project teams using a 'kit of parts' approach which was developed in response to the brief.

Courtesy of Aberdeenshire Council





Each school has been individually designed by separate project teams using a 'kit of parts' approach

Strategic spatial relationships were agreed across both schools including the relationship of classrooms to each other, for which a series of key requirements were identified. These include square-shaped, flexible classrooms and general purpose in-between spaces that could be opened up for flexible learning. Teaching space is designed around a template of a four-classroom cluster with a central group teaching area where wet areas are located to meet accessibility requirements.

Another key part of the brief was the separation of the dining hall and the gym hall – designated as shared spaces. Promoting healthy eating is an important part of Aberdeenshire's curriculum, so ensuring that the dining experience takes place in a light, bright space with direct access to outdoors was important. Separating the two spaces also allows the gym to function independently and provide facilities for community sports use, whilst the dining space can function as an additional flexible learning and community space.

Two of the schools have been constructed using a hybrid glulam and CLT portal frame installed by G-frame Structures – a UK delivery partner of CLT manufacturer Stora Enso. The first, Midmill Primary School, impressed the project teams for the remaining schools and they took the lessons learned at Midmill and applied them to the new school at Turriff, adopting the same hybrid method. The project team for Uryside was also keen to use CLT and glulam combination, but decided that the design and procurement process was already too advanced to change course and the project has gone ahead as a hybrid glulam and steel construction.

"Glulam and CLT were specified for Midmill and Turriff schools for a number of reasons," explains Craig Matheson, architect at Aberdeenshire Council. "The requirement for a flexible learning environment meant an obvious solution was to introduce a portal frame structure at regular centres, which removes the requirement for load-bearing and fixed internal partitions. Once this became a structural direction there were two clear options for us to consider – either glulam or steel."

He continues: "Architecturally we were very keen to explore glulam for the portal frame and as this option developed it became apparent that the benefits extended beyond aspects of aesthetics.

Matheson comments on how CLT met the bracing requirements: "We were required to look at bracing the structure, which in most cases required the bracing to be concealed within the internal lining. With glulam we investigated the use of CLT panels to brace the glulam frame and we recognised a series of benefits to this. On external walls the CLT panels could be integrated into the timber frame kit which provided an insulated, weathertight wrap to the building and internally there was the potential of leaving the CLT exposed as an internal finish. By forming the larger spaces such as the gym hall in CLT it essentially created a huge plywood box to secure the portal frames to. The architecture and the structure were becoming much more intrinsically linked and for us this opened up the possibility for more interesting and honest spaces."

EXPOSED
CLT has been left exposed throughout the buildings to create a warm and welcoming environment for pupils and staff (Midmill Primary School shown above)
Images courtesy of Morrison Construction

Matthew Linegar, head of building systems at Stora Enso and a structural engineer who has spent 12 years specialising internationally in CLT construction, expands on this: "Cross-laminated timber is ideally suited to hybrid applications such as this." He explains: "It has an inherent high in-plane strength and stiffness allowing it to act as a diaphragm plate when used in floors or roofs and as shear walls, thus providing stability to the building and replacing the need for bracing."

"The loadings of the glulam and CLT are also lighter than steelwork which allowed for a lighter weight raft foundation solution that resulted in cost and time saving on the ground work," adds Craig. "Also, there is a speed of construction which ultimately manifests itself into a saving on the contract. The gym hall, for example, was erected in three weeks in full height CLT panels which, when compared with a 12 week masonry build gym hall, represents a significant time saving."

The CLT/glulam fabrication went through a rigorous design feedback process with proposals presented by G-frame Structures in 3D Revit form. This allowed the design team to review, comment and co-ordinate all aspects of the main structure, meaning that potential co-ordination issues could be identified prior to fabrication, resulting in a relatively swift and easy installation process.

"It was an additional benefit that the project teams were able to liaise with the timber specialist, G-frame Structures, on all structural requirements. Having a 'single point' design responsibility prevents any interface falling between the gaps." Comments Craig.

The delivery of the five schools will be benchmark reviewed to give an across-the-board view of three different methods of construction: steel frame at Hillside, glulam and CLT at Midmill and Turriff and glulam with steel at Uryside. Post occupancy reviews will also be undertaken as part of Aberdeenshire's major projects requirements.

Midmill Primary School

Midmill Primary School, located outside the town of Kintore, provides space for 540 pupils. The site sits within open farmland with a proposed housing masterplan to encompass the eastern edge of the town. The site slopes north down to the Tuach Burn and there are two scheduled ancient monuments in close proximity – Midmill Long Cairn and the standing stones at Tuach Hill.

The level changes across the site have

MIDMILL PRIMARY SCHOOL FACTFILE

Location: Kintore, Aberdeenshire
Client: Aberdeenshire Council
Architect: Aberdeenshire Council
Main contractor: Morrison Construction
Engineering: Furness Partnership / G-frame Structures
Hybrid construction specialist: G-frame Structures
Completion: 2016

provided an opportunity to split the school's functions clearly into two separate areas. The teaching spaces sit at the upper level of the site and the more public spaces including main entrance, community areas, dining areas and gym hall are at the lower level. The teaching level, where the pupil entrances are located, is single-storey and the public interfacing area at the entrance of the site is two-storey, creating a level scale across the building.

The new school accommodates 19 classrooms laid out in a two-winged U-plan approach in order to meet the Education Department's requirement for ground level access for all classrooms. This has allowed the creation of a central courtyard, which provides a 'protected' outdoor space for pupils.

At the heart of the school is the entrance area, dining space, library and stairs which extend to form a central amphitheatre used for ad hoc performances and which acts as an extension to the dining space as well as providing space for informal teaching. From this central space there are also visual connections to the staff work-base, staff room and the gym hall which gives the sense of being in the hub of the building.

CLT forms the library, entrance hall, games hall and the main amphitheatre. The material has been left exposed throughout which creates a warm and welcoming environment for the pupils and staff and specification of the material has resulted in additional cost and time savings to the project as there is no requirement for internal plasterboarding or decoration where CLT is used.

Externally, at lower level, the timber structure is encased with locally-sourced Fyfestone brick of varying colours and textures which cuts into the slope with planters extending out to help the building merge into its landscape.

The upper level's key element is an enclosing wall which is horizontally clad, giving a sense of movement around the building. The lesser elements are formed in simpler vertical format cladding with boldly coloured pupil entrances, recessed to create shelter. This allows each year group to make a simple visual connection with their respective entrance. The entry colours continue internally which helps provide a sense of orientation and also assists the teachers in managing year groups.

Turriff Primary School

Turriff Primary School is located in the agricultural lowlands of the north east of Scotland. The town sits on the banks of the river Deveron which starts in the mountains to the west of Huntly and joins the sea at Banff. Given the rural setting and the rich history of agriculture in the surrounding area, the decision was made early in the design process to use glulam and CLT which it was felt would emphasise the structure and make a clear link to the natural landscape.

In response to Aberdeenshire Council's Brief, the design concept for the school focuses on the creation of a large central space, which forms the school's creative and social heart. The concept has been shaped through careful site analysis and maximises the benefits of the views of the surrounding landscape as well as the slight change in level across the site.

From this initial concept plan, sections and elevations were developed for a first class modern education facility. The design incorporates the latest in sustainable

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Turriff Primary School
Images courtesy of Morrison Construction

technology whilst not forgetting the most basic of architectural principles such as the quality of light and space.

The school is formed and orientated in order to benefit from the maximum amount of daylight during the different school break times. The building is formed by positioning two relatively simple classroom blocks at an oblique angle opening up towards the view to the south. The space between the teaching wings creates the 'heart' of the building which features a pitched roof and a glass wall to the south that connects inside and out. This dynamic single-storey space is 11 metres at its highest point to make the most of the space and the use of natural light.

"We see this space as the focal point for the school," says architect Colin Robertson of Halliday Fraser Munro. "Pupils and staff will pass through the space many times through the day at high or low level and will use the space for different functions. It is a space for the entire Turriff community with opportunities for a variety of activities."

The two-court gym hall is formed by CLT which has been left exposed internally. Stora Enso CLT is bonded using formaldehyde-free and environmentally friendly adhesives which are suitable for internal exposure and the material is increasingly being recognised for its ability to create an internal environment which feels warm and safe, particularly in schools and healthcare buildings.

"From our point of view the exposed timber finish within the hall was very appealing and we are pleased with the warm and natural feel of the completed building which we believe is primarily due to the exposure of the CLT and glulam frame." Notes Colin. "Also CLT offered a faster, less labour intense construction which was a big factor for Aberdeenshire Council who had set a relatively tight programme for the works."

Even in its small details the design takes advantage of the internal and external connection of the structural wood to the surrounding landscape. The design embraces the wood at its heart as the building expresses the structure throughout. Wherever possible, the structural timber elements have been left exposed and detailed in a sensitive way such as setting back the adjacent plasterboard walls and creating shadow gaps at the junctions. Working with Furness Partnership, G-frame Structures designed a bespoke connector for connecting the glulam portal to the roof purlins so that the connections would be concealed when viewed from inside the building, having the appearance of neatly mitred joints. The connectors are made of 16 mm steel which has been fabricated to the angle of the roof and the front facade, covered with an over-strengthening steel 'gusset' and fixed to the glulam portal from above and to the side with no physical fixing from the underside.

Glulam posts have been used within the coupling detail for the timber window frames as a way of harmonising the material palette and reinforcing the sense of nature as pupils and staff look out towards the fields and tree lines in the distance. ■

TURRIFF PRIMARY SCHOOL FACTFILE

Location: Turriff, Aberdeenshire
Client: Aberdeenshire Council
Architect: Halliday Fraser Munroe
Main contractor: Morrison Construction
Engineering: Furness Partnership / G-frame Structures
Hybrid construction specialist: G-frame Structures
Completion: 2017

TIMBER EXPO
NEC BIRMINGHAM
10 – 12 OCTOBER 2017

Timber Expo to address safety and quality in buildings

Timber Expo announces its return to Birmingham NEC from 10 – 12 October 2017. The show will cover a wide range of timber applications, from timber frame through to plywood, CLT and timber cladding, while exploring the latest developments across the industry as well as products and innovations from around Europe

With thousands of new products on offer from a wide range of exhibitors, Timber Expo is one of the leading events for architects. Exhibitors confirmed to attend already include fastenings and fixings provider, Schmid Scrauben Hainfield; manufacturer and leader in fire containment technology, Intumescent Systems; Czech distributor of plywood and packing, Orlimex; Latvian sawmill, Vudlande Sawmill, which will showcase the newest form of sawmilling technology at the show, and Gaujas Koks Ltd, which has 25 years of CLT manufacturing experience and will operate two major sawmills with a total output of 300,000m^3 of finished products.

In addition to a products showcase, there is also plenty of scope to learn and pick up tips. This year, in collaboration with TRADA, a leading authority dedicated to informing best practice for design, specification and use of wood and timber in the built environment, the Timber Focus Theatre will welcome speakers onto the stage to discuss how the industry is pushing the boundaries on the use of wood, wood for good health, technical timber, and also how designers are working directly with fabricators.

Students from the Emergent Technologies and Design Programme at the Architectural Association are also developing an innovative timber installation. Co-ordinated by TRADA and sponsored by Hanson Plywood, the design derives from extensive research on plywood composite material systems, focused on the integration of doubly curved plywood forms and tensile cables.

Given the increasingly complex regulatory framework around building materials, the Timber Expo has introduced a series of CPD seminars bringing together leading authorities to deliver advice and guidance on key issues including:

- essential guidance on safety and fire prevention in buildings;
- guidance on sprinklers, fire doors and dampening;

- latest advice on cladding and other flammable building materials;
- health & safety – responsibilities in the construction process and protecting you and your employees;
- improving safety through technology.

Offsite construction is a trend that grows stronger every year, and it seems inevitable that the future of the building industry will include a significant element of prefabrication, offsite assembly, volumetric modular building and automation. There will be a dedicated Offsite Theatre, which has also earned a special category at the exhibition awards.

Jackie Maginnis, CEO of the Modular and Portable Building Association (MPBA) commented: "Timber Expo 2017 represents a massive opportunity for the MPBA to educate the wider industry in the significant advantages of volumetric modular construction".

There are more exhibitors specialising in this area of construction at the show than any other, including Wernick Group, Portakabin, GTX Containex, Tufeco and Modularize. It's also likely that many of the breakout products to be found on the Innovation Trail will be aimed at this fast-developing area of construction

Timber Expo will seek to educate and inform the wide variety of construction professionals who will be visiting the show in the key design and build considerations, ongoing and future challenges and the quality of products and components that all contribute to the success of the industry.

Seminars and talks will be given on volumetric construction, with several keynote speeches concerning the residential sector, plus insights into the training and skills shortages faced by the housebuilding industry.

Nathan Garnett, Event Director at Media 10, which runs the show, said: "In addition to showcasing the latest products and innovations across the timber sector, the Timber Expo will deliver the latest information on safety and quality in buildings for all in the built environment, from architects, contractors, local housing authorities, and developers. This is crucial in the current climate and only by coming together, through shared knowledge and learning, will we be able to tackle the issues surrounding building safety head on."

For more information and free registration, please visit: www.timber-expo.co.uk

Engineering the perfect floor

Russell Calder of Havwoods explains the benefits of engineered timber over solid timber for flooring

The UK market offers both solid and engineered wood flooring, however in some areas where climates are harsher, only engineered products are sold by some companies.

Wood's hygroscopic qualities cause it to expand and contract as the levels of moisture in the air change, due to the seasons or the use of heating and air conditioning, for example. An engineered wood product is produced by bonding layers (generally of hardwood, softwood or ply) together so that the grain runs perpendicularly; this makes it very difficult for the plank to expand/contract, thus making it far more stable. The thickness of the top layer (otherwise know as the wear layer or lamella) of oak, walnut, or other chosen species can vary from a thin sliver in a veneered product right up to a similar thickness to that above the tongue in a solid wood plank: the thicker the wear layer the more often it may be re-sanded (usually cited as a benefit of solid wood flooring).

Since they are more stable, engineered planks are far less likely to cup or gap, and it also means that much wider planks may be produced, currently a trending aesthetic. Engineered planks offer quicker, and consequently cheaper, methods of fitment. Furthermore, since less of the feature wood is used, it makes better use of these usually slower growing timbers.

Solid oak is far more likely to expand or contract when subjected to changes in the surrounding atmosphere. In the winter months we close the doors and turn the heating on which dries the air out and the relative humidity of the air reduces, this in turn means that your wood floor will lose moisture and as the moisture content of the floor drops it will start to shrink and you can expect gaps between boards. There are ways to counteract this with humidifiers but it's not a solution many of us want to accept. Conversely in the summer we open doors, switch off the heating and the sun draws moisture from the ground. This creates a higher relative humidity which

enters our homes through the open doors and windows and the wooden floor starts to absorb moisture and expand, if the floor absorbs too much moisture the expansion will be too great and the floor could start to lift. Most of this can be avoided with a good quality engineered floor.

Another benefit with a quality, engineered board is that most of them are suitable for installation over underfloor heating. However there's something more to understand in all this. Wood floors have developed massively in the last 20 years I have been involved with them and the technology and research has brought many benefits. Mills around the world have invested huge amounts or resource into developing unique finishes such as hand scraping, band sawing, UV cured hard wax oils, smoking, weathered, burnt and many other processes to create special colours and textures which can only be achieved in a controlled factory environment. Some of these finishes are simply beautiful and others are extremely hard wearing, either way if you were to sand the floor down you would lose the finish. Also with an engineered board you can have a much wider plank and still have a stable product

Wood floors have developed massively in the last 20 years

meaning that most of the special finishes you see on the market today will be on an engineered floor.

Finally, there are two main reasons why a wood floor will look tired or worn out. Number one is simply a massive footfall without good care and maintenance and this is simply user error. A correctly maintained floor will last for many years providing the right finish is chosen in the first instance and the correct maintenance procedure is put in place. The second reason is because the floor has moved after installation and is no longer flat, thus creating high spots, which are being walked on more than the rest of the floor and the floor is wearing irregularly. This rarely happens with an engineered floor as they are more stable, helping them to stay flat and stay looking great.

Russell Calder is marketing director at Havwoods

Safeguarding structural timber against damp

Alex Massingham of RIW offers advice on the waterproofing strategies needed to help meet increasingly popular engineered timber buildings' design lifespans

There remain very significant challenges for clients and consultants in achieving an integrated, weatherproof and watertight structure

Some of history's most iconic structures – from Westminster's Great Hall to the architecture of Venice – make extensive use of structural timber, presenting those who care for them with multiple concerns such as damp-related deterioration and fungal attack. Today we are witnessing a renaissance in the materials use for load-bearing applications; thanks to developments in timber engineering, such as cross-laminated timber or CLT and glue-laminated members.

Recent forecasts by Allied Market Research indicate that the engineered wood market is projected to grow by 24.8 per cent by 2022. However the perennial 'Achilles heel' of wood, i.e. damp, and the industry mantra 'to keep its feet dry', remain as necessary today as it ever was.

Through the centuries, most of the timber used in construction was literally hewn on site – with tools as rudimentary as an adze (early axe) – while the UK industry today uses the very latest advancements in modern timber engineering. In addition to open or closed panel, and even dual-frame systems steadily increasing in popularity for housebuilding, solutions such as CLT and laminated veneered lumber, or LVL, are all gaining traction for commercial work.

While contemporary timber-based systems are generally supported by sophisticated design software, there remain very significant challenges for clients and their consultants in achieving an integrated, weatherproof and watertight structure.

Basically, no matter how quickly and slickly the BIM model might indicate that the engineered timber elements will go together, involving an experienced waterproofing manufacturer at the outset can save the project team significant delays or other headaches on site.

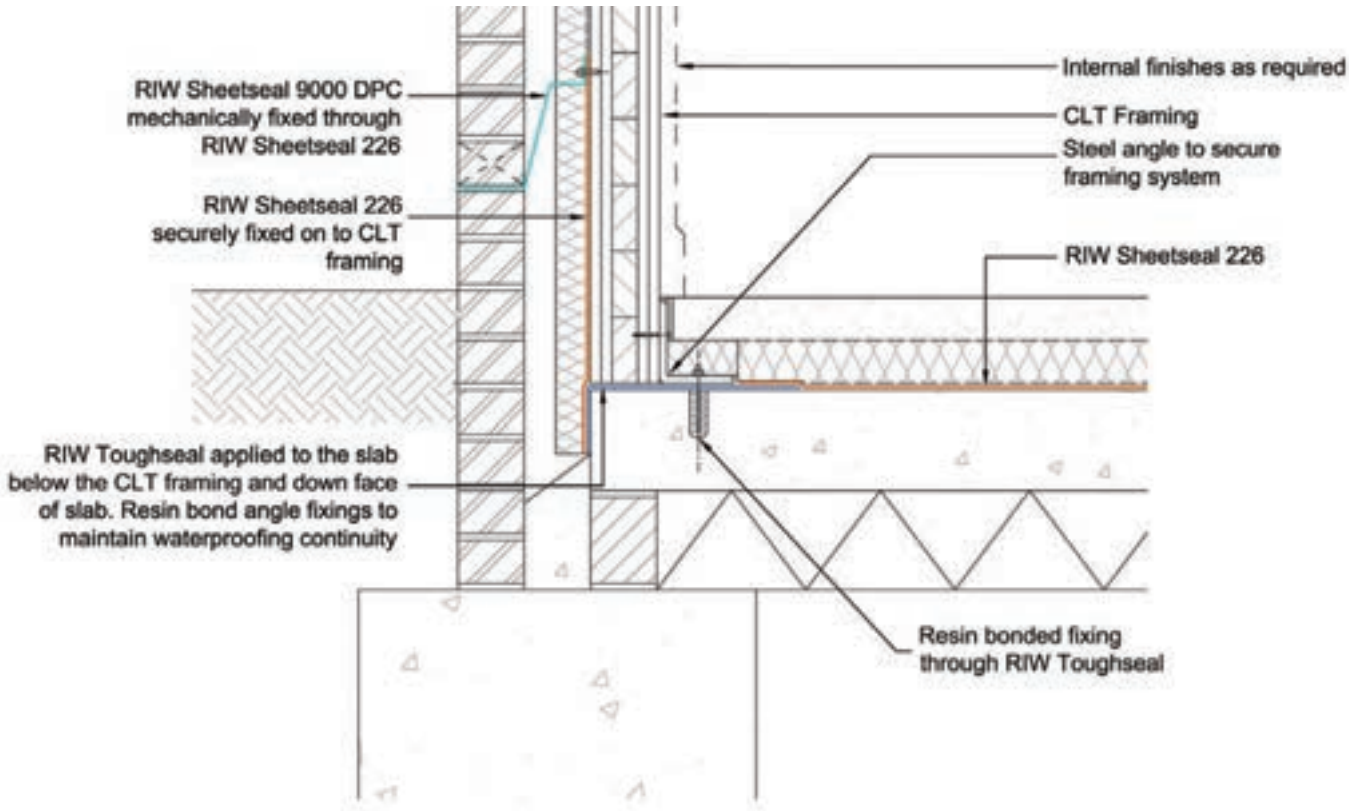
In fact, if the price premium for timber systems is to be justified, the potential programme advantages of a prefabricated timber solution must be properly exploited. And as part of that, the interfaces between the timber elements and the supporting sub-structure must be waterproofed quickly and effectively.

So whether the frame members are being located on a simple slab, or installed on top of some type of concrete undercroft, the barriers to protect them from damp must fit with the method statement as well as the geometry of the interface.

The pragmatic option is to engage with a specialist capable of providing fully compatible and dependable solutions; suited to the project's specific technical and other challenges. These might relate to site topography and ground conditions, as well as the timber elements' size, loadings and proximity to other parts of the structure. The window of opportunity for applying waterproofing systems can also have considerable influence on their final specification.

There are significant similarities between employing engineered timber and SFS construction, and an early decision needs to be made on whether to create the water-proof barrier beneath the slab or above it. This is an illustration of why a specialist manufacturer can provide crucial guidance to the project delivery team.

Reinforced concrete floors can be cast across seam-welded membranes fixed on top of a blinding layer, though many groundworkers prefer the user-friendly installation characteristics of bentonite impregnated membranes, whose overlaps



SLAB EDGE DETAIL
Detail of framing system constructed using CLT plus waterproofing membranes

do not require taping or welding. Used horizontally or vertically over the face of piled retaining walls, the bentonite material swells on contact with groundwater and is effectively 'self-healing'.

However, where the groundworks solution features a series of pile caps and ground beams, or possibly lift-pits, installing the waterproofing barrier beneath the slab may become prohibitively problematic. However, although creating a raft foundation may consume a slightly higher volume of reinforced concrete than individual pads with a floor slab cast between them, it permits a far more straightforward waterproofing solution, likely to offer overall savings, while simplifying the construction sequence.

Atop the slab, the waterproofing strategy will normally use a combination of liquid-applied and sheet membranes to achieve the best solution. This said, the most efficient designs will always consider each projects proposed construction sequence and the building materials selected. A rugged two-coat product is often used to create a strip along the line where the frame is to be erected: allowing resin anchors to be installed as required, but maintaining the integrity of the damp-proof membrane (DPM), before the sheet applied membrane overlaps the strip to complete the waterproofing barrier and/or gas protection.

In addition, project design and delivery teams should also bear in mind the likelihood that no matter how much thought and effort has gone into the pre-construction period, major contracts almost always throw up unforeseen situations which have to be swiftly dealt with. This is where the experience of the waterproofing specialist will pay dividends, in being able to provide on-site assistance, including technical or installation advice and, often, customised CAD drawings or hand sketches of workable details.

There is no doubt that, supported by its sustainability credentials and the work of industry bodies such as the Structural Timber Association, the use of engineered wood is set to increase still further. Accordingly, through the use of correctly specified and expertly applied waterproofing solutions, such structures will be able to perform for the full extent of their design life.

Alex Massingham is national sales manager for RIW

Why the oldest window frame material is the modern choice

As the industry searches for new alternatives to PVCu, Tony Pell of The Wood Window alliance investigates the resurgence of timber window frames

Architects appreciate the look and feel of high quality materials, but are naturally attracted to innovative ideas, especially when they bring the promised of enhanced performance. So it's interesting to see timber – the oldest of materials for window frames – enjoying something of a renaissance over the last few years. It's not something that's happened by chance, but the result of a determined effort by the industry to shake off earlier performance issues, while at the same time reinforcing its sustainability credentials.

There has been a significant investment in the quality and engineering of wood windows in the UK in recent years. The days of site-finishing single-glazed redwood frames are long gone. Now, fully factory-finished double or triple-glazed windows are the norm, made from defect-free, laminated, slow-growth Scandinavian softwood that has a 60-year planned service life (commonly twice as long as PVCu).

The industry has also listened to what architects want. All Wood Window Alliance (WWA) members are BIM-ready and offer Environmental Product Declarations (EPDs), while most can provide Secured by Design certification. Windows that are easier to clean or redecorate from inside a building have been developed, both sliding sash and casement; as well as factory finishing in different colours, inside and out; and new, more durable products using modified wood such as Accoya, or aluminium-clad timber systems.

With the adoption of warm-edge spacers, low-emissivity glass and argon gas fill, double-glazed timber windows are now widely available with U-values of 1.2 W/m^{2}K, while triple-glazed windows can achieve 0.7 or even lower.

U-VALUES
Double-glazed timber windows are now widely available with U-values of 1.2 W/m^{2}K

Environmental considerations

With the spotlight on low carbon construction and sustainability, timber is enjoying a revival in the construction industry, and the benefits are just as applicable when timber is used for window frames in developments of any size and scale. All members of the WWA offer FSC or PEFC Chain of Custody certification, and the organisation has worked hard to provide the evidence to back up environmental claims being made by window companies.

Tony Pell, chairman of the WWA, commented: "We worked with the British Woodworking Federation to complete a feasibility study for a typical wood window frame against the Materials Health elements of the stringent Cradle to Cradle Certified standard." The results show that wood is a healthy option that can easily

There has been a significant investment in the quality and engineering of wood windows in the UK

meet the Silver level of the standard, making timber a good choice for any eco or conservation project.

This study complemented a Life Cycle Assessment conducted by Heriot-Watt University showing that all timber frame types – engineered softwood, modified softwood and aluminium-clad timber window frames – made to WWA standards are more environmentally-friendly than PVCu in every end of life scenario considered. The same study calculated that a standard wood window would save 160 kg CO_2e when fitted instead of a PVCu window, making a potential saving of over 1.5 tonnes of CO_2e for the average home from the window frames alone.

About The Wood Window Alliance

Founded and managed by its members, the WWA has more than 20 members manufacturing many different types of timber windows and doors. It provides the reassurance of high quality, performance and sustainability standards. All products are third-party certified to meet British Standards, typically offering unbeatable warranties, and all members are BIM ready, have FSC or PEFC Chain of Custody certification and meet all building regulations including Part Q (Security).

Tony Pell is chairman of The Wood Window Alliance

Thermally modified timber: standing the test of time

Howarth Timber's Phil Barman looks at the developing trend for thermally modified timber cladding and how it can circumvent potential issues while retaining environmental benefits

Architects wishing to create a natural, aesthetically pleasing appearance for the exterior of buildings continue to turn to timber for a solution that is both practical and sustainable.

Timber has a life expectancy of decades, and there are undeniable environmental benefits of working with a natural, sustainably sourced material. It's also very easy to work with, being lightweight and easy to trim and fit when compared to alternatives like PVC.

Unlike PVC, timber cladding is 100 per cent recyclable, so it can be invaluable to building projects that include tough targets relating to carbon neutrality. Projects that require temporary cladding can turn to timber for a solution that can be demounted and reused. What's more, cladding acts as an insulator, reducing the building's energy costs and muffling outside noise.

In particular, exotic hardwoods and durable softwoods remain a popular choice: western red cedar is the material that specifiers seem to return to time and again, thanks to its lengthy life-cycle, generally knot-free straight grain and famously rich colour.

However, working with a natural material also has its potential drawbacks as untreated timber has a tendency to warp, swell or shrink due to changes in moisture. Western red cedar's colour can also vary from light pinkish tones to reddish brown.

While chemical treatments can have harmful environmental effects which counteract timber's sustainability, thermally modified timber provides a solution to many of the potential drawbacks of untreated wood, increasing its durability without the use of chemicals.

Increased interest in these products has led suppliers to develop full thermally modified timber cladding ranges.

This method of treatment involves heating timber to over 200°C with steam used to prevent cracking and burning. Once cooled, the wood is remoisturised to around five per cent.

The principle is simple: heating timber removes most of the moisture, making it less likely to warp or swell. Importantly the treatment also removes resin from the

Thermally modified timber provides a viable solution to many of the potential drawbacks of untreated wood

Non-chemical heat treatment means the timber will weather more evenly, giving a better aesthetic effect with significant cost savings

timber, which means that the sugars which fungi could survive on are eradicated thus reducing the potential for fungal attack.

Thermally treated redwood and clear pine products offer the same rich colour as western red cedar, but the non-chemical heat treatment means the timber will weather more evenly, giving a better aesthetic effect with significant cost savings. As both timbers are sourced from Europe and are available with PEFC or FSC certification, there are clear sustainability benefits.

The thermal treatment alters wood in such a way that hardwood timbers such as frake, which otherwise has little commercial value other than in plywood, are suitable for cladding. Not only that, but thermally modified frake and ash cladding both also benefit from a richer appearance and more expensive feel – making them among the most popular high-end cladding options in the past year.

Installers report that thermally modified timber is easier to cut with reduced wear on tools, and as the resin has been removed it's lighter too, making installation easier.

Unlike chemical methods, the treatment penetrates all the way through the wood so thermally modified timber won't be subject to rot at the core.

Thermally modified timber is unsuitable for structural use as the treatment permanently alters the cell structure of the timber, making it brittle and reducing its tensile strength. When fitting thermally modified timber cladding, installers should follow fitting instructions carefully, and it's best to use pre-drilled boards and hand-nail boards into place to avoid splitting. Thermally modified timber should be installed using stainless steel fittings only.

As a key component of cladding is weatherproofing, thermally modified timber's increased weather resistance makes it a sound choice.

Offering a host of benefits, easy installation and unbeatable environmental credentials, thermally modified timber will be part of the cladding landscape for a long time to come.

Phil Barman is a hardwood timber specialist at Howarth Timber

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Treating your timber right

Michael Nicholls of Organowood explores reasons why architects should ensure their projects are environmentally friendly and 'effortlessly ecological'

It is common knowledge amongst architects that external timber requires a protective treatment in order to preserve the natural aesthetics and durability of the wood. However, many architects remain unaware of the detrimental effects chemically enhanced treatments can have on the environment.

The blend of aesthetic and practical qualities makes wood a popular material to feature in residential and commercial projects. Professionals within the field will know that although wood is a hardy material, it is also a hygroscopic material and reacts constantly to the conditions of its environment. When exposed to external elements such as rain, wind, frost, UV-rays and surface dirt, wood requires an additional treatment to provide the necessary protection in order to maximise the material's chances of withstanding the unpredictable British weather.

Pressure-treating wood has been a common method to preserve exterior timber, however it is not the only solution available, nor does it yield the best results. In recent years, following the worldwide determination to be more environmentally aware, an increasing number of eco-friendly wood treatment solutions have made their way into the market. These offer professional architects an alternative solution to chemically laden and potentially hazardous products.

But what are the key reasons why architects should ensure their projects are eco-friendly?

Environmentally cautious clients

In today's environmentally conscious society, eco-friendly products are often at the front of client's minds. Whether your client is a homeowner, business owner or in the public sector, everyone favours professionals who use and endorse environmentally friendly products, promoting a healthier environment for all.

Earth-friendly ingredients

Many architects are unaware of the hazardous processes and harmful 'ingredients that are used to pressure-treat wood.

During the pressure-treating process, toxic substances are injected into the wood and subsequently released into the air. Once produced, these harmful substances continue to seep into the environment via surface water and soil, potentially causing ecological harm.

Environmentally friendly solutions are manufactured using only natural ingredients causing no harm to the local ecosystem.

Lasting protection that goes full circle

Although pressure-treated wood ensures lasting protection against external elements as designed, at the end of its life, the wood is then classed as 'hazardous waste' which means that it cannot be recycled or reused. It is also not permitted that the wood be burnt or incinerated due to the toxic chemicals that may be released in the smoke and ashes. Pressure-treated wood has to be disposed of in a controlled manner, causing unnecessary effort and landfill waste.

Sustainable treatment solutions provide the same lasting, effective protection but without the use of harmful heavy metals, biocides and solvents. As such, organic wood protection systems are 100 per cent recyclable and reusable.

Keeping it natural

As well as being kind to the environment and protecting exterior wood from harsh elements, environmentally friendly solutions are also known to compliment the natural look of the timber. Eco-friendly exterior wood protection ages wood with a silver-grey hue over time, enhancing the timber's natural aesthetic.

One of the most common pressure treatments uses chromated copper arsenate (CCA) which imparts an easily distinguishable greenish tint into the timber.

The safe solution

Arsenic, a chemical used in CCA treatments, is known to migrate to the surface of the wood. As such, the chemical can be picked up on hands and unknowingly ingested by children and animals. Similarly, CCA-treated wood poses a risk for professionals working with the timber. When cutting or sanding any chemically treated wood, it is advised to wear a dust mask, goggles, and gloves.

A 12 foot long 2x6 piece of CCA lumber contains enough arsenic (around one ounce) to kill over 200 people.

Going eco

Natural treatment methods are a tried and tested ecological alternative to pressure-treated finishes. They are both aesthetically pleasing and sustainable, while being suitable for domestic and commercial use.

Michael Nicholls is sales manager at Organowood

Schiedel win thanks to IGNIS PROTECT

The award winning IGNIS PROTECT is a CE approved wall pass thru system allowing flue pipes to pass through interior or exterior walls made of combustible materials. The unique features of this product has helped **Schiedel** win the Flueing and Ventilation Product of the Year at the Hearth & Home exhibition in Harrogate when it was introduced to the market Ignis Protect is suitable for both SW and DW connecting flue pipes passing through interior or exterior walls and is available in both 90° and 45° versions. Please visit the website for more details.

www.ignisprotect.com

Brimstone Thermally Modified Timber

Brimstone from **Vastern Timber** is the first thermally modified British timber sourced exclusively from native woodlands. Ideal for cladding, decking, external joinery and furniture, the Brimstone range includes thermally modified ash, poplar and sycamore. The thermal modification process reconfigures the wood to deliver exceptional stability, durability and aesthetic uniformity that is resistant to water and fungus – the main cause of wood decay. The Brimstone range represents levels of sustainability for specifiers interested in timber products.

www.brimstonewood.co.uk

Gutex delivers a cool passivhaus home

32 Landsdowne Drive in Hackney is quirky two-level home with a topsy-turvy layout. The above ground section was constructed using cross-laminated timber with a Pro-Clima airtight vapour membrane and a triple layer of **Gutex** wood fibreboard insulation from Ecological Building Systems. Following CLT assembly, the Pro-Clima DA airtight weather resistant vapour layer was used to completely encase the timber structure. For more information please visit Ecological building systems' website.

www.ecologicalbuildingsystems.com

Leader in timber preservation technology

Koppers has a diverse range of highly effective products, from timber preservative systems, for use in timber frame and landscape sectors, to specialist fire retardants, stabilizing oils and pigment systems for enhancing the aesthetic qualities of timber such as cladding. Through cutting edge research, development and collaboration with industry stakeholders, Koppers continues to lead the way in the development of next generation preservative systems to enhance and extend the use of timber. Koppers products in conjunction with their other advance solutions and services, make Koppers the preservative partner of choice.

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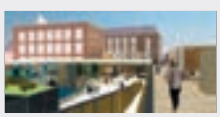
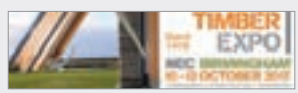
Norbord is at the heart of the business



Recycled shipping containers in York are being converted into a community space to offer affordable spaces to start-up businesses. Providing an area where locals have an opportunity to enjoy the city, Spark:York has turned to **Norbord** to help create a hub for social businesses. Using 540 sheets of 18mm SterlingOSB3 to clad the inside of the containers and 342 sheets of CaberShieldPlus to cover the floors, Spark:York aims to create an aesthetically pleasing, practical space. The durability, versatility and clean, grey finish of CabershieldPlus is a perfect fit for the community project.

www.norbord.co.uk

Affordable window system



Joinery manufacturers and fabricators looking for a low cost, aluminium clad timber window system, should visit the **AluWood Windows** stand, T438 at Timber Expo. AluWood's aluminium clad timber window and door system is easy-to-manufacture and it offers the strength of aluminium on the outside and warmth of timber on the inside. The flush casement system can be top or side hung, as well as fully reversible. With the durability of aluminium on the outside and the insulating benefits of timber on the inside, the system is a very popular choice commercial projects such as hotels or offices.

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