

trä!

A MAGAZINE OF INSPIRING ARCHITECTURE
FROM SWEDISH WOOD » ISSUE 1 » 2021

**ICE RINK FOR
COMMUNITY
SUPERMARKETS
OF THE FUTURE
WOOD FOR
THERAPY**

TRÄ MEETS
Åke Axelsson

KNOWLEDGE
Digitalisation for
the environment

NEWBUILD IN A HISTORICAL SETTING

Three volumes with own shape

add personality

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Arkitekten berättar

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Building Better Days

trä!

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Swedish Wood represents the Swedish sawmill industry and is part of the **Swedish Forest Industries Federation**. The forest industry is one of Sweden's most important business sectors. It provides employment throughout the country. Thanks to its natural raw materials and products, the forest industry has a key role in the development towards a sustainable, biobased society.
Trä magazine is aimed at architects, structural engineers and everyone else interested in architecture and construction.

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Mathias Fridholm Director, Swedish Wood

Passion & knowledge behind new look

HUDIKSVALL, SWEDEN It was on this day, exactly a year ago, that I went to my local supermarket to do the usual weekly shop. But why is this visit one I still remember? The automatic doors are always flanked by posters for the evening papers, usually about murder, disease and scandals.

Maybe these posters attracted more attention before the age of the internet, but there are probably many of us, at least in my generation, who still cast an eye over them as we pass by. On this particular day I was in a slight hurry, but I still spared them a quick glance – and could hardly believe my eyes:

»Have you got treasures at home? Pine furniture is hotter than ever. Here's a good old pine table in the home of a superstar Kardashian.«

It might sound like an overreaction but, having worked with wood for 25 years and enjoyed a passion for beautiful, solid wood furniture, I had a feeling of euphoria as I read this poster for Aftonbladet. I have visited furniture producers large and small on many continents, particularly Asia, and have been impressed by the way enthusiasm and knowledge have driven these companies to develop new and exciting furniture designs in wood.

In this and future issues of Trä!, we are broadening our perspective on wood use to also include interior architecture. Here in Sweden too we have designers and furniture producers with a strong interest in developing furniture and interior products in wood. However, the trend is not being led by the traditional farmhouse tables that (if Aftonbladet is to be believed) the Kardashians have fallen in love with.

Instead, the driver is a desire to work with a renewable raw material that allows designers to play with form, colour and combinations of other materials. Just as we have said in the context of wood construction, interior products store carbon dioxide for long periods of time, and they are therefore an important part of the green climate transition. Circularity, recycling and furniture that can be passed down the generations are also exciting concepts in the interior segment that have a bearing on wood construction. I have no doubt our articles in this area will be of interest, providing new and useful perspectives for all our readers. Enjoy!



Newspaper billboard, February 20th 2020.

Mathias Fridholm
Mathias Fridholm



Florent Michel @ 11h45, Yann Moreau

Clad in wood from a nearby forest, the discreetly positioned cabins make a statement about the area's ecotourism.

Exporting cabins

BREITENBACH, FRANCE Access to a cabin is an important part of Norwegian culture, and the simple huts invite both locals and tourists to discover nature in a natural way.

So when a hotel in northeast France wanted to offer ecotourism and activity holidays, what could be more natural than taking inspiration from Scandinavian design? Here the Norwegian architects have worked with their French colleagues to create a new take on the traditional cabin.

OBJECT Breitenbach landscape hotel
ARCHITECT Reiulf Ramstad arkitekter & ASP architecture
STRUCTURAL ENGINEER Nid Perché

On a hillside, a respectful distance apart, stand 14 guest cabins, all clad with vertical, untreated wood from a nearby forest. The cabins vary in scale – from 20 up to 60 square metres – and are split into four groups, depending on design and size. The interior is minimal and rustic, with pale wood throughout. Integrated storage and furniture combine with the different dimensions of the structure to create a vibrant atmosphere, complemented by natural light from large windows. « **wj** reiulfрамstadarkitekter.com



Rasmus Malbert

A square in motion

SÄFFLE, SWEDEN A public place to create poetry and play board games and table tennis – that also encourages more activity in the centre. This was the aim when the main square in Säffle, Stortoget, gained this large play furniture item dubbed »Rag rug«

OBJECT Trasmattan
ARCHITECT Outerspace arkitekter
STRUCTURAL ENGINEER Woup

last summer. Chess sets, ping-pong bats and magnetic poetry sets could be borrowed on site.

Trasmattan was created by Outerspace Arkitekter in partnership with Woup, who transform offcuts from CLT production into new products. The furniture thus makes use of what would otherwise have gone to waste and is a prime example of how material can be recycled, but its form and tactility are also meant to encourage social interaction and play. The installation proved popular with Säffle's residents, but has now been taken apart and put into winter storage. The furniture is modular, so it can be split up into several smaller units that can be moved around, meaning that residents will be able to continue enjoying it in the future. « **wj** outerspacearkitekter.se, woup.se



Sindre Ellingsen

Five metres off the ground, the treehouse looks out over Hardangerfjord. The structure is firmly fixed to the trunk of the growing pine.

A true treehouse

ODDA, NORWAY After a 20-minute walk from Odda, along the steep, forested cliffs that line Hardangerfjord, two treehouses come into view. With their shingle cladding and rounded forms, they look like large pinecones. Raised five metres from the ground, they also awaken a desire to play and climb trees, although a bridge provides easy access.

The design centres on a steel cylinder fixed around the trunk of one of the growing pines, with frames of laminated veneer lumber (LVL) then radiating outwards. The cylinder itself is concealed behind wooden battens. A primary and a secondary floor system of wooden joists also form part of the structure, helping to create the soft silhouette. The untreated shingles on the façades form a protective shell around the buildings, and as the material silvers over time, they will become even more a part of the forest.

OBJECT Woodnest
ARCHITECT Helen & Hard
STRUCTURAL ENGINEER Oddvin Myklebust, Nordplan

Despite the small area of 15 square metres, each treehouse can sleep four adults – although the owners recommend two per building – and comes with a bathroom and kitchenette. « **wj** helenhard.no



Sanna Trasmann

The installation encourages people to interact, while the lighting brings a warm glow to the public space.

Shadows bring warmth in the dark

STOCKHOLM, SWEDEN Last year, social distancing became the new normal. But while it was important to maintain physical distance, people still needed to interact and fend off involuntary loneliness. As the dark and cold of autumn descended, Odenplan in Stockholm gained an installation to give people hope, joy and a chance to meet. »Winter embrace« is shaped like a lantern, as much an art installation as a

place to promote wellbeing and community.

The lantern is made using 45x70 framing timber, with vertical, milled studs on the long sides giving way to horizontal studs on the ends, variously spaced to create a play of light and shadow.

This is a place to sit for a moment, alone or together. An interactive element sees the light intensify when someone passes by, and the architects wanted this to prompt questions about human relationships and how we interact with each other. « **wj** outerspacearkitekter.se

OBJECT Vinterfamn
ARCHITECT Outerspace arkitekter & Mattias Lazar

Masonite Beams Byggsystem

Lättbalkssystemet med låg klimatpåverkan

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Sara Kulturhus, Skellefteå
Foto: Martinssons



Large windows make the light CLT frame visible even from the outside. The angle of the façade gives the homes a clear identity.

Angular façade and light surfaces

PECKHAM, UK From a distance you might be fooled into thinking the two new apartment blocks in the borough of Peckham in south London are clad in brick, like their neighbours. But a closer inspection reveals that they are actually clad in wide, rust-red shingles – 10,000 of them, shaped by hand.

Internally, however, there is no mistaking the visible CLT frame, complemented by surfaces of knotty spruce and generous windows to create a bright and welcoming atmosphere. The floor is terrazzo – a blend of crushed stone and cement – except in the hall and bathroom, where the red-brown tiled floor echoes the exterior of the buildings and the local vernacular.

The angled façades of the two buildings reach up over the roof, creating a monolithic feel that sits comfortably with the wider built environment. The blocks are connected by the concrete foundations, which extend to form privacy fencing at street level. «

OBJECT Rye apartments
ARCHITECT Tikari Works
STRUCTURAL ENGINEER Webb Yates & Eurban

[tikari.co.uk](http://www.tikari.co.uk)

Semi-circle with a view

ØYNA, NORWAY Øynaparken sits above the stunning Trondheim fjord, and was originally intended as a place where its owners could sell their farm produce, but the concept has gradually expanded into a full visitor destination. The existing restaurant and conference centre have now been joined by 10 cabins, with two hotel rooms in each.

The cabins are arranged in a semicircle with panoramic views of the landscape. To preserve the amazing views and the

natural silhouette of the site, they have been placed a little way down the slope, with green, grass-covered roofs contributing to the overall rural look. The cabins cantilever out from an underground corridor, reducing wear on the surrounding lawns. The corridor is made from stark concrete to give a raw and robust feel compared with the warm wood in the cabins. The local builder prefabricated all the surface units, which comprise CLT, insulation and dark standing glulam cladding on the exterior to give a low-key finish. Internally, the ceiling and walls are clad in alternating dark and light panelling. «

OBJECT Cultural landscape hotel
ARCHITECT Green Advisers
BUILDING CONTRACTOR Faanes & Gjøgla

[greenadvisers.no](http://www.greenadvisers.no)



The dark glulam cladding and the positioning on the slope combine to make the cabins subtle and low-key.

Light eaves exposed

RÖSTÅNGA, SWEDEN In Röstånga, two artists wanted a studio adjoining their home. The brief was clear: to create a large and open studio on a small budget, and it was this that dictated the design of the extension. With its dark façade and exposed eaves, where

OBJECT House for two artists
ARCHITECT Förstberg Ling
STRUCTURAL ENGINEER Structor

the roofing felt contrasts with the light, exposed stone of the interior, the building draws on the traditional Skåne longhouse, using authentic materials with a modern twist. Even the dark external doors have exposed wood on the inside.

The large eaves provide protection on sunny and rainy days, and a glance upwards reveals exposed wood and projecting glulam beams. The exposed glulam beams and noggings create a repetitive grid pattern on the internal ceiling, with the geometry accentuated by 16 rooflights that admit light and tie the square building together. «

[forstbergling.com](http://www.forstbergling.com)



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The wood in the different parts of the building demonstrates the material's flexibility and local expertise.

Recycling station with warm feel

VILLARD-DE-LANS, FRANCE When a forestry company on the Vercor plateau was developing a new, eco-friendly recycling facility, it seemed obvious to highlight local tradition by including as much wood as possible. The recycling station is meant to improve the working environment both physically and mentally, hence the choice of a soft and tactile design. This is particularly apparent in the building's roof. On the inside, the exposed roof trusses create a warm contrast with the machinery and the concrete walls of the separate compartments. Externally, the eaves combine several layers of chunky untreated timber, each board placed on top of the other, to form a pleasingly pleated effect. The part of the building housing offices boasts walls in sanded wood.

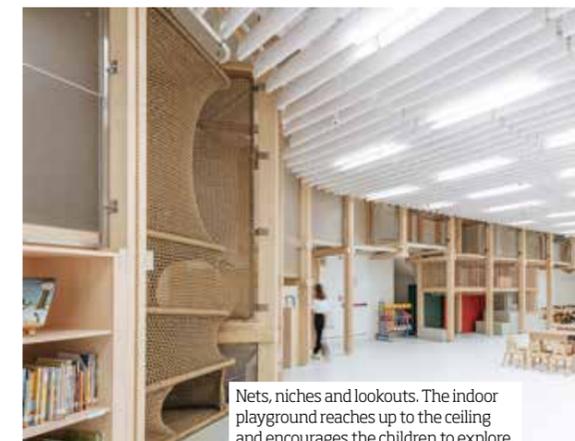
In using different dimensions of timber and finishes, the architects wanted to show just what could be done with local materials and knowledge. The structure uses 186 cubic metres of wood, all sourced from the neighbouring spruce forest and split, sawn and machined on site. «

OBJECT Recycling station
ARCHITECT Atelier PNG
STRUCTURAL ENGINEER Vessiere

[w| png.archi](https://www.png.archi)

Soft surfaces among the skyscrapers

KENNEDY TOWN, HONGKONG Children learn through play and they play with everything they have around them. But when space is limited, new solutions have to be found. In Hong Kong's lively urban environment, it was tough to find a large enough plot for the school's 300 children. The solution was to create an indoor playground where the preschool children could freely explore. It stretches along the walls and up to the ceiling, giving the children places to climb or crawl as they investigate the different functions – including lookouts, little niches and climbing nets. The structure is made from glulam



Nets, niches and lookouts. The indoor playground reaches up to the ceiling and encourages the children to explore.

OBJECT Playwall
ARCHITECT Eureka

using pine (pinus radiata) from New Zealand. Glulam was chosen to provide a stable and secure supporting frame. The warm, tactile surface is complemented by subtly diffuse

lighting placed above the ceiling's polyester shell, forming a cosy and inviting playground. Having the play area extend between classes encourages the children's development and is not distracting at all, according to the architects. «
[w| eurekadesign.hk](https://www.eurekadesign.hk)

Magnus Höij, Federal Director, the Federation of Swedish Innovation Companies (FSIC)

The climate requires new thinking

STOCKHOLM, SWEDEN The switch to a sustainable society needs to happen fast. It has to involve all of us and all sectors, but the community development sector bears extra responsibility. Construction and civil engineering have a considerable impact on the climate, so a transition here is particularly important and urgent.

Our members – architects and consulting engineers – are conscious of their role. But what is more important is that we have masses of ideas about how to work differently to reduce the carbon footprint of our projects. There are many things that can and must be done.

We have learnt a great deal from working with new materials, with the lessons from wood construction opening up whole new opportunities to build industrially, high and fast. Concrete and steel will always be needed, but they have to be supplemented with other materials and, not least, recycled to a greater extent.

But it is also about being better able to measure and monitor the climate impacts of the project and being able to do so right at the design phase. Cederhusen in Hagastaden is a great example of how modern technology, technical know-how and active sustainability work have gone hand in hand for a better understanding of the effects that the build is having on the climate (read more about this project in Knowledge on page 34).

But the big question is not about the individual projects, but about unleashing the creativity and inventiveness of the whole sector, particularly in the very early stages.

In our view, we often get stuck working with individual technical solutions, old practices and outmoded business models, and in many ways this is impeding the transition to more sustainable construction. Building regulations, public procurements, our standard contracts, perhaps even our way of organising ourselves in industry and employer organisations – all this risks cementing old structures and outdated ways of working.

We have produced the report *Innovation for the Climate*, which gives a picture of all the creativity and innovation that our members can call on to find new, climate-smart solutions to the problems of our age. But the report only scratches the surface; there is a groundswell of interest in these issues among our members.

But even more importantly: what we offer is not just the development of new solutions that can then be reused. Above all, our sector is a resource for creating unique, custom solutions. If only the right questions were asked, many of the answers could be exciting and groundbreaking.

We cannot leave the climate work to the government, the client or anyone else. We all have to do our bit.

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DEMOUNTABLE MODULES FOR IMMIGRANTS

PHOTOGRAPHER
Marcel Kultscher

OBJECT
Rigot collective dwelling centre

ARCHITECT
Acau architecture
STRUCTURAL ENGINEER
Entreprise Générale

GENEVA, SWITZERLAND A building that had to be erected quickly and could also be taken down within ten years. These were the criteria when 370 refugees needed housing. The solution was two five-storey buildings made from 230 prefabricated modules.

The modules have a CLT floor structure that is combined with walls and ceilings in glulam panelling. Two versions were produced, one comprising an access balcony and entrance with a seating area and a free-standing kitchen module inside, the other with a sleeping area and wc. The modules are arranged directly on top of each other, with the walls taking up the vertical

loads, while the horizontal loads are channelled into the larch frame. The façades are clad in Swiss oak. With the modules it is possible to vary the space in each apartment, from two to eight rooms, and this flexibility also leaves open the option of later accommodating students or using the buildings as a hotel.

In addition, it is easy to reconfigure the buildings: they can be stacked in different formations to create two taller buildings or several smaller ones. ✦

- Even the foundations are wood, with durable larch stems used for the pilings, so the land can be fully reinstated once the buildings have been taken down.
- Using wood from nearby forests meant that local forestry companies could be involved, making the project economically, socially and ecologically sustainable.

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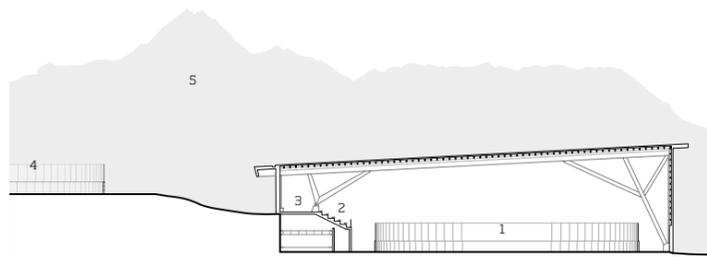


RINK
BECAME
SYMBOL
OF
HOPE

The small Canadian town of Hazelton's
new wooden ice rink has become a
symbol of hope for the future. Despite its
chilly content, this is a building that
radiates warmth – in more ways than one. »

TEXT Sara Bergqvist PHOTO Ema Peter

The new hub with sports hall, ice rink
and café has proved popular with the
locals. It also serves as a prototype for
other places facing the same challenges.



Cross section 1. New rink. 2. Seating area. 3. Concourse.
4. Demolished rink. 5. Roche de Boule mountain.

Hazelton and recreation centre Upper Skeena's new ice rink, with accompanying sports hall, gym and community room, has become the pride and joy of the whole region. Not just because it can now be used all year round for various activities, but also because it shows what can be achieved when everyone unites around a shared goal. The catchment area, stretching over a radius of 110 km, takes in eight small towns and two municipalities with a total population of around 7,000, roughly 70% of whom belong to Canada's First Nations.

»We live in a remote, sparsely populated part of the country that has long suffered major economic and social problems. The opening of the new ice rink has given an incredible boost to the local community and sparked new hope for the future.« says Peter Newbery, who led the fundraising drive.

The success of the project was due in part to pure luck. Ice hockey and skating are incredibly popular in Canada, and there are a large number of ice rinks all over the country, even in small settlements like Hazelton, but many of them are reaching the end of their life and need to be replaced. These small communities often cannot afford to do this, despite recognising the need – these facilities may fulfil an important social function and provide a vital opportunity to stay active. A few years ago, the Canadian trade body BC Wood therefore began considering whether the old facilities could be replaced with new ones in wood – which would be both more economically viable and more sustainable.

»This led to a request for us to develop a prototype that could be used in multiple locations,« explains architect John Hemsworth.

As part of this project, a town was selected as an example to test the snow loads that the building would have to bear. That town happened to be Hazelton – where the community, driven by Peter Newbery, had begun thinking about how to replace the old ice rink built by volunteers. As well as being on the brink of collapse, it was not particularly spectator-friendly. When it was -20 degrees outside, it was just as cold inside.

»In the new ice rink, we have seats that are heated from below, so now it's fantastic. It means so much to the children and young people that their parents can come and watch them play ice hockey and skate,« says Peter.

It was decided from the start that the ice rink would be built in wood. British Columbia, where Hazelton is located,



The large roof span was a challenge. The solution, with a different structure at each end, is both elegant and strong.

has plenty of raw material and a long tradition of wood construction.

»We were keen to use wood, because we wanted to involve as much of the local workforce and as many local products as possible, and we decided to use John Hemsworth's original design. Then we added an extra element, because we wanted to use the arena all year round,« continues Peter Newbery.

In addition to the ice rink with its locker rooms and service areas, the 5,000 square metre facility has a small sports hall for activities such as basketball, plus a gym, a café and a community room that is used for various purposes, from a nursery to weddings, meetings and parties.

Wood plays a prominent role, both in load bearing and the decorative finishes. The imposing 365 x 950 millimetre structural glulam beams in Douglas fir have a unique design that creates a distinct identity. At one end of the ice rink, the roof's glulam beams project out from a treelike structure with three glulam branches. At the other end, the glulam beams rest on a V-shaped structure of tapered glulam posts, plus a vertical glulam post on the back wall (see cross-section above).

»Normally, you would probably put a post at each end, but this wasn't possible due to the large span of the roof. The principle we used is more or less the same as the one employed to

fix a springboard to the edge of a pool,« says John Hemsworth.

A slim, vertical steel profile takes up some of the stress on the inside of the »springboard« structure.

»Steel works better for points that are subject to major tensile forces, while wood is better for compression points,« says Robert Malczyk, structural engineer at Equilibrium Consulting and John Hemsworth's regular partner on the structural front.

The nodes at the top are secured using steel fixings with inset plates. Lower down, the fixings are more hidden to create an aesthetically pleasing finish. The same principle has been »



Driving force **Peter Newbery**

» **WE WANTED TO INVOLVE AS MUCH OF THE LOCAL WORKFORCE AS POSSIBLE.** «

» used in the sports hall, but on a much smaller scale.

With the exception of the vertical steel profiles, steel fixings and concrete foundations, practically the whole building is made of wood. All of the glulam beams are made from a particularly high-quality variety of Douglas fir that grows in British Columbia. The rest of the wood material in the roof and walls is spruce. In the locker rooms, the walls are lined with spaced cedar laths.

»Everything has been fabricated locally, the glulam beams in a factory near here and other wall elements on site by local workers. By the time the glulam beams were up, the wall panels had been finished, ready to be fixed into place in the

frame. Each section of wall panels took three or four days to erect, totalling 18 frames for the whole building,« John Hemsworth relates.

The façade in western red cedar will change colour over time.

»We've used a toxin-free surface treatment, a kind of stain (like iron sulphate, Ed.) that originates in Finland and is resistant to wind and weather, and this one treatment will last a lifetime. We also haven't needed any special fireproofing treatment. At almost a metre thick, the huge glulam beams will resist fire much better than a steel structure would,« adds John.

The ice rink now has a warm and pleasant home, where the wood helps to soften the hard sounds from the ice and heated seats make the hall spectator-friendly.

»The sound is much more damped than usual for an ice

Upper Skeena recreation centre HAZELTON, CANADA

ARCHITECT: Hemsworth architecture.
CLIENT: Regionen Kitimat-Stikine.
STRUCTURAL ENGINEER: Robert Malczyk,
Equilibrium consulting.
COST: CAD 17 million.
w|hemswortharchitecture.com

One bonus of using wood has been its great acoustic properties, which are particularly noticeable during ice hockey training and matches.

»The sound is much more damped than usual for an ice

rink. Plus, the wood gives a wonderfully warm and welcoming feel that a steel building could never achieve. During a tour for 12 representatives of the local First Nation community, one of them was so taken with the beauty of the building that they said 'I want to live here',« says Peter Newbery.

The hope now is that other towns will draw on Hazelton's experiences and more of them will take the leap and invest in wooden ice rinks.

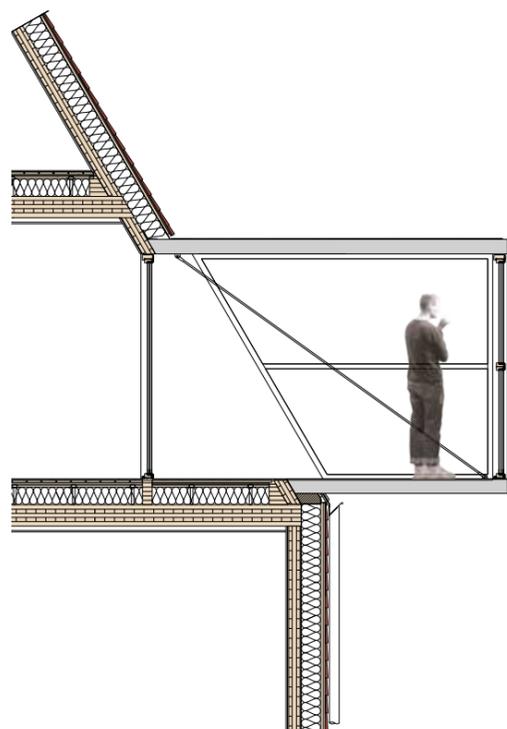
»I like the idea of other people wanting to use our prototype, if only as inspiration for choosing wood over steel,« concludes John Hemsworth. 📍

A new silhouette in World Heritage Karlskrona

The naval town of Karlskrona is known for a creative spirit that goes all the way back to 1680, when King Karl XI chose to locate Sweden's new naval base here. Since then, the town has attracted innovators of all kinds, who have been courageous and inventive in pushing boundaries and turning their ideas into reality. There is always an eye on the future here, as demonstrated by the Kilströmskaj housing project. »

TEXT Katarina Brandt PHOTO David Valldeby

Karlskrona's town centre is built on islands. The new Kilströmskaj development, inspired by the World Heritage town's older buildings, has a silhouette that merges into the skyline.



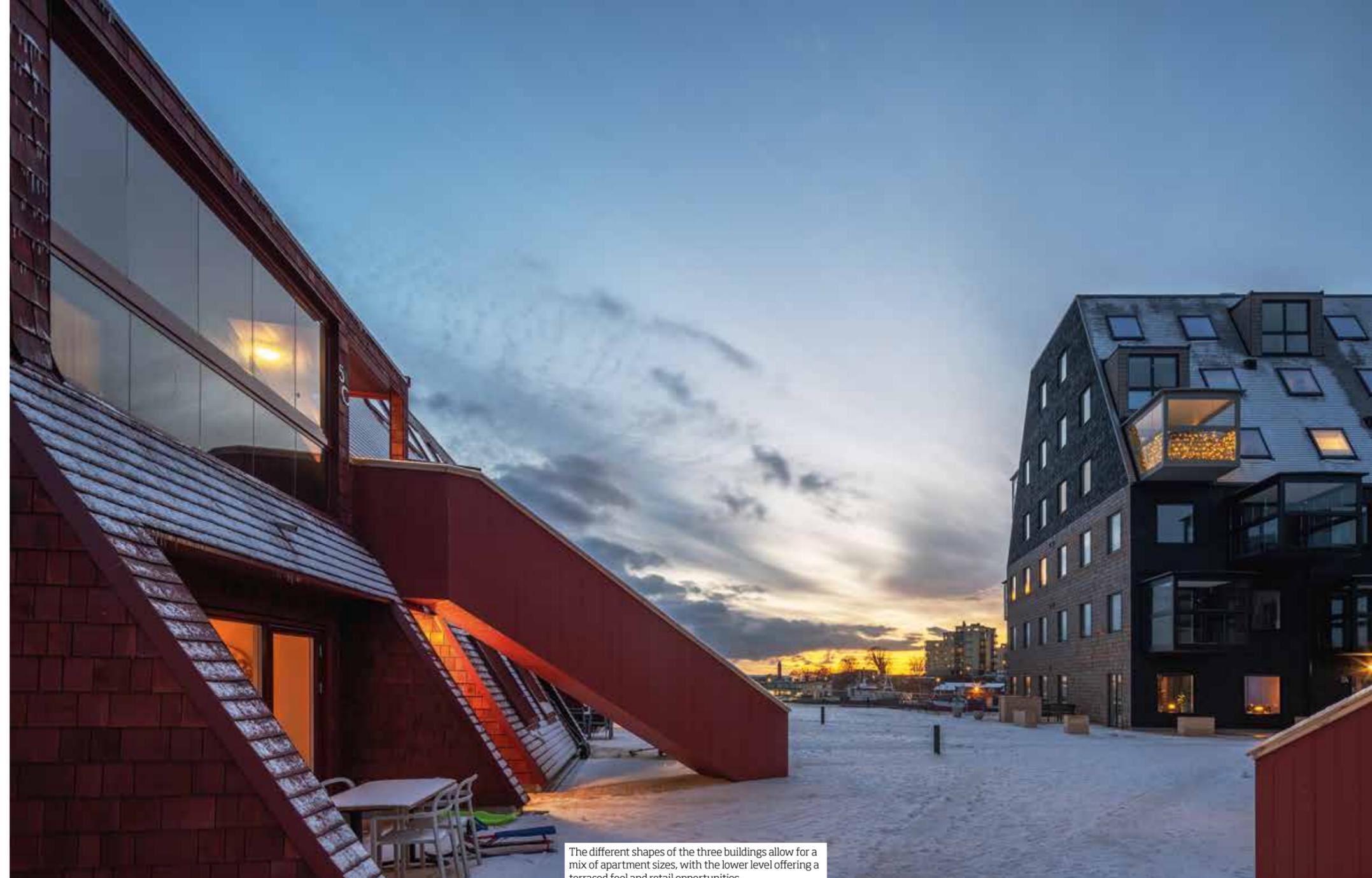
Structural detail.

Karlskrona's town plan, with this many military buildings, squares, boulevards and three striking churches, reflects the ambition of Sweden at the height of its powers. It also includes several interesting wooden buildings on both large and small scale. The rope walk in the old naval harbour is one of the town's oldest preserved buildings, and at 300 metres, it is the longest wooden building in the country. Amiralitetsskyrkan from 1685 is Sweden's biggest wooden church. Alongside the more monumental Karlskrona, there are also picturesque districts with attractive wooden buildings.

Karlskrona's town centre is built on islands. Björkholmen, adjoined to the central island of Trossö, represents the oldest part of the town, where the first shipyard workers built their low little timber cottages, and it is said that most of the wood came from the naval fleet. On land previously used as a car park, there now stands Kilströmskaj, one of Karlskrona's most talked-about housing projects – built in wood, but this time using cross-laminated timber from Södra's plant in Värö.

Kilströmskaj lies on a peninsula on the eastern flank of Björkholmen, right next to Saltöbron bridge. The project is the brainchild of Svensk Bostadsutveckling, a subsidiary of SBU Framtid, itself a collaborative enterprise owned by Wingårdhs Arkitektkontor, JSB Construction and Kai-Larsen Affärsutveckling. The company's mission is to build apartment blocks in wood, with high design ideals, at attractive prices through industrial construction.

»The strength of our setup is that three different perspectives and areas of expertise are represented from the start on each project. We're moving from project- to process-based working methods and we include the architect at an early



The different shapes of the three buildings allow for a mix of apartment sizes, with the lower level offering a terraced feel and retail opportunities.

stage,« explains Torsten Kai-Larsen, founder and CEO of SBU Framtid.

Kilströmskaj was designed by Wingårdhs, with Gerth Wingårdh and Joakim Lyth as the lead architects. The project is informed by the location, with the idea that the apartment blocks would clearly differ from the rest of the built environment, establishing their own place in the townscape. From the outset, there were two specific ambitions. One was to use as much wood as possible in the design, and the other was that the project would include a social sustainability component, giving something back to the town and its residents.

»Naturally, a World Heritage town with strong traditions and heritage from the late 17th century sets high standards for any new buildings. Initially, we therefore needed to convince the County Administrative Board that our proposal had relevance. One of the things we did was to track down the first town plan from the late 17th century, so we could place the site in a historical context. When you have an

Architect **Joakim Lyth**

»**IT'S IMPORTANT TO LOOK BACKWARDS, WHILE ALSO LOOKING FORWARDS.**«

opportunity to build something new, it's important to acknowledge the history, to look backwards while also looking forwards,« says Joakim Lyth.

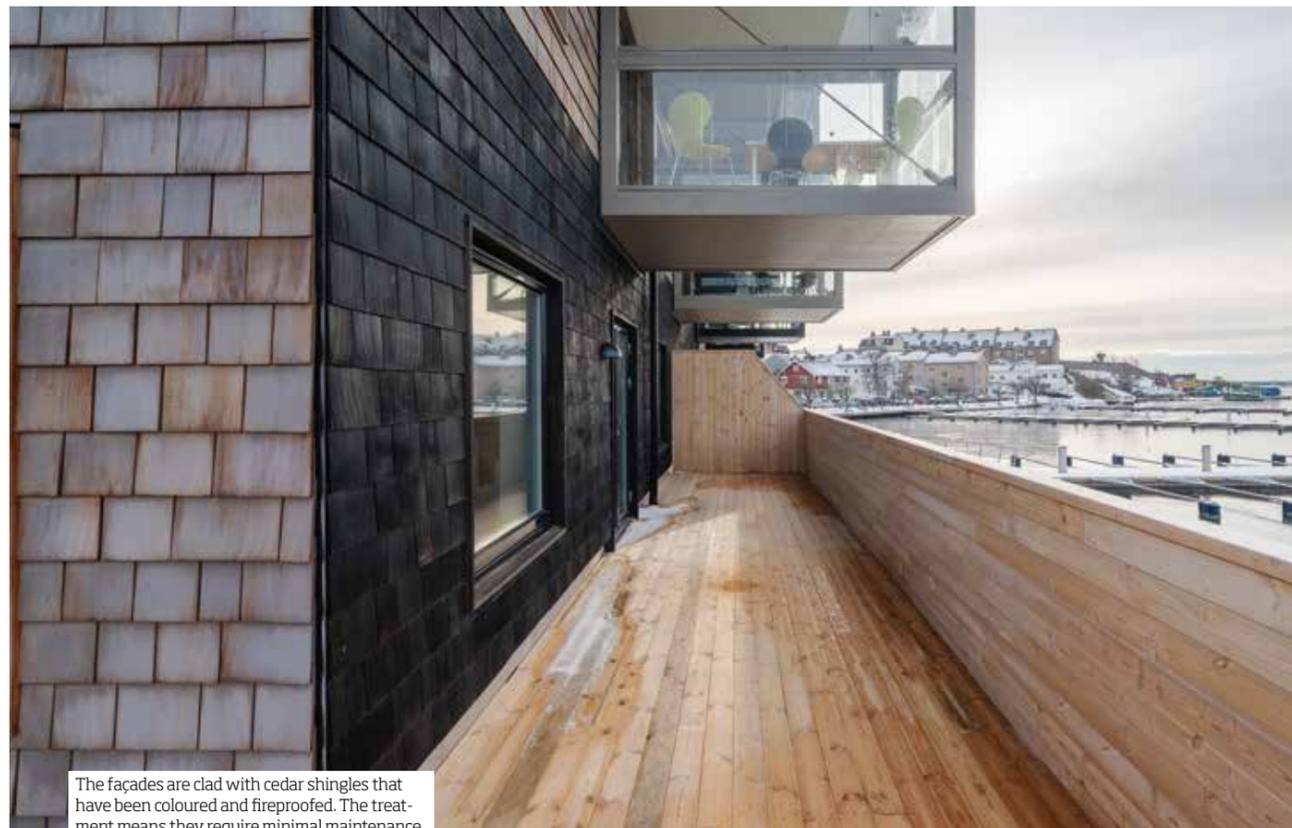
The result is three unique wooden buildings with strong geometric forms and clear silhouettes that borrow characteristics from the landmarks of Karlskrona. One large and two smaller buildings define the site and create a distinct courtyard space. The different designs of the buildings have allowed for a wide variety of housing, with the 44 homes including everything from duplexes and apartments with the qualities of a terrace to units for combined living and retail at ground level. Pulling the roof line down makes the six- and

four-storey buildings look lower than they are, and they have a distinctive silhouette that can be seen from way out at sea, just like the coast's lighthouses and beacons.

The apartments on the ground floor have their own entrances and private outdoor spaces, while the others have glazed balconies that project at right angles from the façade for the best views. Beneath the buildings there is a shared garage, plus store rooms and utilities. To the south west, a stepped public area has been built up and a restaurant will be opening on the quayside in the spring.

»Our hope is that the people of Björkholmen and central Karlskrona will see the quay as a new social space for the public. And it's by no means an afterthought. We want to make it clear that the area doesn't just belong to the residents,« comments Torsten Kai-Larsen.

The project has not been plain sailing since Wingårdhs began the design work in autumn 2014. Challenges to the plans were taken through the courts, until the Land and Environment Court opted to reject the case in spring 2018. »



The façades are clad with cedar shingles that have been coloured and fireproofed. The treatment means they require minimal maintenance.

» Work began in early 2019, and December 2020 saw the first buyers move in. Two of these were Jan and Marie Lennartsson, who have waited four years for their two-bed property in Kilströmskaj. For them, the main attraction was the central location and proximity to the sea, but also the aesthetic of the buildings and the fact that they would be built in wood.

»It feels good to live in a wooden home, but we are particularly taken by the look and feel of Kilströmskaj. I like the historical touches, where the architects have drawn on the many monumental buildings in the town. It's a great way to take Karlskrona in the right direction, with a different approach to its development,« says Jan Lennartsson.

The three buildings have a CLT structural frame, with the elements 140 millimetres thick on the lower levels and 120 on the upper levels. On the outside sits 220 millimetres of hard insulation, followed by a cavity and an outer façade of cedar shingles, giving the wall a total depth of 400 millimetres. The absence of a plastic vapour barrier is a significant environmental benefit, but it also meant that the insulation could not be made thicker due to the risk of condensation. Because the wooden structure has no thermal bridges, however, heat losses are still very small. The buildings are expected to meet Passive House standards. The fact that so much has been done to hone the energy performance of Kilströmskaj means that the project has qualified for funding with green mortgages. These means lower interest rates, but also stability because the mortgage companies are keen for their invested funds to create environmental benefits and contribute to sustainable social development.

»When you want to build in wood in a good, competitive way, it's important that the material choice is made early in the project. It's not possible to sit on the fence, because a concrete frame and a wooden frame have very different requirements, making it difficult to switch further down the line. The question we asked ourselves when working on

Resident **Jan Lennartsson**

»IT'S A GREAT WAY OF DEVELOPING KARLSKRONA DIFFERENTLY.«

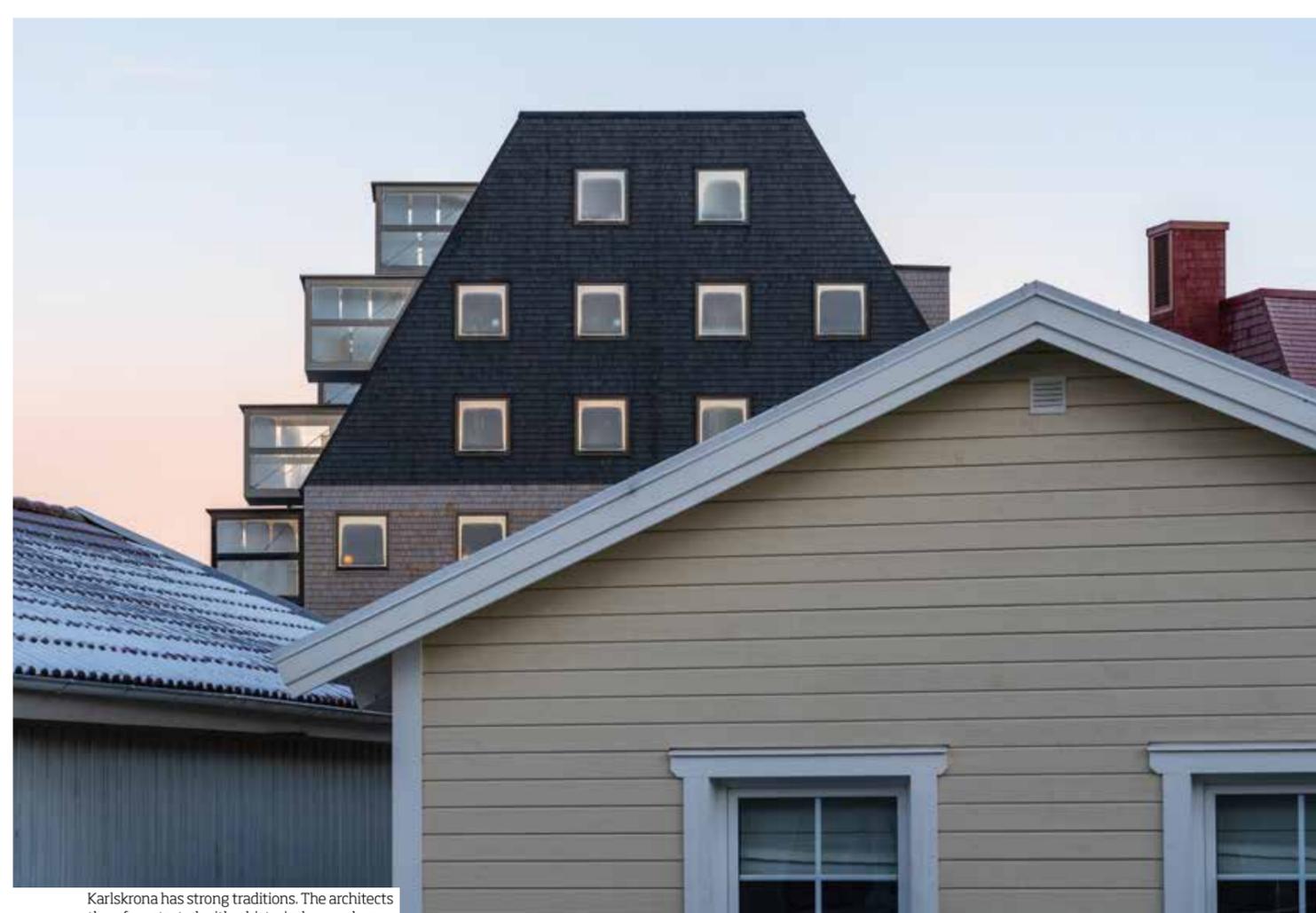
Kilströmskaj was how we could best exploit wood's precision and capacity for prefabrication. We've tried to advance the industrialised processes of wood construction a little,« says Joakim Lyth.

The majority of the walls in Kilströmskaj also form the roof of the building, which has placed particular demands on the building envelope, not least because the site is quite exposed. The chosen solution was cedar shingles coloured red, black and grey. They were also industrially fireproofed using vacuum pressure impregnation, where the fireproofing agent is fixed into the cell structure of the wood.

»The cedar shingles have natural protection against rot and are good for exposed locations, while the colouring makes the façade durable and maintenance free. The aim is that it will last a lifetime,« states Torsten Kai-Larsen.

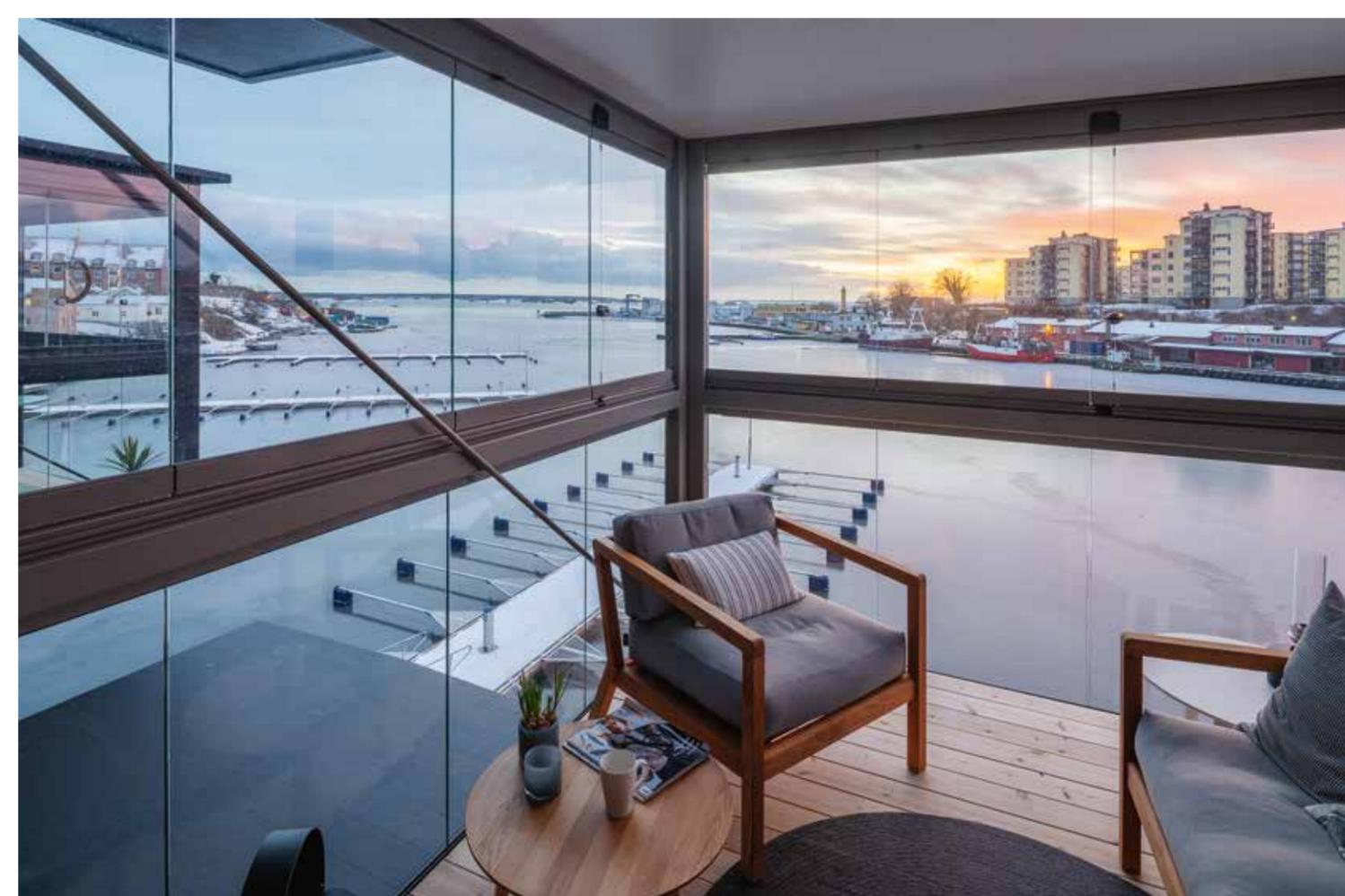
Acoustics can be a challenge in new buildings, which is why building acoustician Klas Hagberg from Acouwood was called in to help with Kilströmskaj. He has developed the floor system so that it meets the criteria of sound insulation class B, which exceeds the minimum requirements in the Swedish building regulations (BBR).

The solution is based on all the utilities lying above the mass timber floor structure. The void between the mass timber element and the wood flooring allows for efficient installation of utilities and provides effective damping of impact sound. The gap also serves as a horizontal shaft to »



Karlskrona has strong traditions. The architects therefore started with a historical map when planning the new buildings, so they could fit in with their older cousins.





The glazed balconies project at right angles from the façade for the best views. Plasterboard was widely used inside - one lesson is that a sprinkler system would have benefited the design without costing more.



Plan.

Kilströmskaj
KARLSKRONA, SWEDEN

ARCHITECT: Wingårdhs.
CLIENT: Svensk bostadsutveckling.
STRUCTURAL ENGINEER: Fristad bygg.
AREA: 6,100 square metres.
wj wingardhs.se

» each apartment, meaning that the utilities can be fixed to the flooring. This avoids contact between them and the floor structure, meaning that vibrations from the utilities are not able to spread to the apartment below. But the most important design feature is that no floor structure is long enough to risk any kind of audible oscillation.

Although Jan and Marie Lennartsson have not been in their apartment long, they have already noticed how comfortable it all feels. The investment in extra thick floors and internal walls for better sound insulation has paid dividends, as have the oversized ducts for input air, which provide almost soundless ventilation.

»The apartment really is incredibly quiet. We haven't noticed any disturbing noises, either between the apartments or from outside, despite living so close to Saltöbron.«

The couple were among the wave of buyers who signed up for an apartment early in the project, and they have been able to provide input in order to develop and improve the project.

»It has been an exciting process, and we feel that everyone involved has listened to us, the people who will be living in Kilströmskaj, and been genuinely interested in our opinions.«

Kim Ahlmalm led the team at Fristad Bygg that was responsible for installing both the frames and the façades. Kim has extensive experience of working with cross-laminated timber, having fitted around 4,000 elements since he erected his first wall, eight years ago.

»CLT is a very forgiving material to work with. As long as you've been careful to align the first level with the concrete slab, installing the rest of the elements is incredibly easy. You sometimes have to do a bit of problem solving, but the benefit of wood is that it allows for relatively simple adjustments compared with assembling concrete elements.«

Kim and his team have worked with manufacturer Södra on ways to improve and simplify the installation. He firmly believes that what can be done at the factory should be done there, in order to increase efficiency.

»For example, you could damp-proof the end-grain surfaces from the start by taping them at the factory. That's something we had to do on the construction site. Our structural engineer Adam Kihlberg and I are also looking at how to make building with cross-laminated timber more efficient. It mainly comes down to logistical planning, but also assessing the fixing models.«

Kilströmskaj has required a lot of plasterboard to meet fire safety standards. Another solution would have been to use a sprinkler system, reducing the need for plasterboard - a lesson that Torsten Kai-Larsen will be taking with him into the next project.

»If you include the actual handling of the plasterboard on site, using a sprinkler system is no more expensive. It's also good for the design and allows for the use of more exposed wood in the interiors. All in all, we've learnt a lot from Kilströmskaj. The precision of the structural elements has paved the way for new production methods,« he says. ☺



WELCOMING ENVIRONMENT CREATES SUPERMARKETS AS COMMUNITY HUBS WITH A FOCUS ON WELLBEING AND SUSTAINABILITY

TEXT Ellinor Thunberg PHOTO Mikael Olsson

Tomorrow's supermarkets are carefully designed and adapted to their location. What's more, the burning issue of climate change is increasingly at the forefront of all decisions. Building in wood became a natural step for both Lidl and ICA in 2020. First came Lidl's new store in Visby, where Link Arkitektur and Lidl have developed Sweden's first carbon-neutral building as a pilot project for the Sweden Green Building Council. In the drive to achieve the new certification for climate-neutral buildings, meticulous analyses revealed that wood construction helped to significantly reduce overall carbon emissions.

The climate issue was just as important in Sigtuna, but here there was also an ambition to create a brand-new retail concept for Lidl, one not previously found in the company's repertoire. The bold architecture, with pleated roof and strong geometric features, reflects this decision to do something new, diverging from the traditional Lidl store. Wood was chosen for the store in Sigtuna for various reasons, over and above the climate considerations, with the plot itself playing a direct role in the decision.

»The site in Sigtuna has rock on one side and clay on the other. This was very soft, so pilings were required for the foundations, and then building in wood is better because of its light weight. Lidl also appreciated the short lead times for mass timber – it would take just six or seven weeks to deliver the entire structural frame. Wood was therefore quicker, without being all that expensive. An

unusual design like this would have cost us much more in concrete,« says Andreas Lebesch, lead architect at Link Arkitektur.

The design in Sigtuna is complex, made up of nine pitched roofs, with each gable supported on two large glulam beams, which in turn sit on glulam posts. All the external walls, and many of the internal walls, are load-bearing and made of CLT. There is also a substantial glazed section.

»The supermarkets in Visby and Sigtuna both have relatively simple structures using roof beams and post-and-wall systems in wood to hold the building up. The big difference is that the spans and the geometry are more complicated in Sigtuna, where we used steel braces in a hybrid structure. The mass timber elements give a solid, welcoming feel to the building. Both CLT and glulam have the advantage that they can happily be left exposed in the interior, which also means less in the way of building materials.«

November saw the completion of Lindvallen's new ICA Supermarket, whose architecture was encouraged to reflect the local environment. A glazed central gable marks the entrance, and behind the large windows lies the exposed wooden structure. There was an early requirement for the building to sit comfortably in the mountain setting, and that naturally led to thoughts of a wooden carcass.

»Like most supermarket chains, ICA has a well-developed concept. But the industry has changed a lot from being that 'barn out in the field', and now the buildings are being »

With a warm and welcoming interior, supermarkets can also become places to meet and interact, like at Lidl in Sigtuna, which is reminiscent of a food hall.



David Valdeby



The design of the Lidl in Sigtuna is complex, with nine pitched roofs creating a welcoming atmosphere.

Lidl Sigtuna SIGTUNA, SWEDEN

ARCHITECT: Link arkitektur.
CLIENT: Lidl Sverige.
STRUCTURAL ENGINEER: Sweco structures.
AREA: 4,000 square metres.
wj linkarkitektur.com

» tailored more to the residential environment. ICA is leading the way on environmental thinking and has worked hard to optimise its technical systems for greater energy efficiency. It was a natural step to consider building materials in terms of their sustainability,« says Camilla Gyllestrand, the architect leading the project at Liljewall.

ICA in Lindvallen is built around a post-and-beam structure in glulam, with the walls, roof and floor system made from CLT. The façade is finished with horizontal glulam cladding that is treated with black distemper, in a strong nod to the other buildings and traditions in Sälen. But internally as well, it was important for customers to be able to see plenty of wood, not least in the entrance,

which at night lights up like a welcoming lantern. The first thing customers encounter is the exposed Y-beams, like indoor treetops, which are load-bearing and decorative in equal measure.

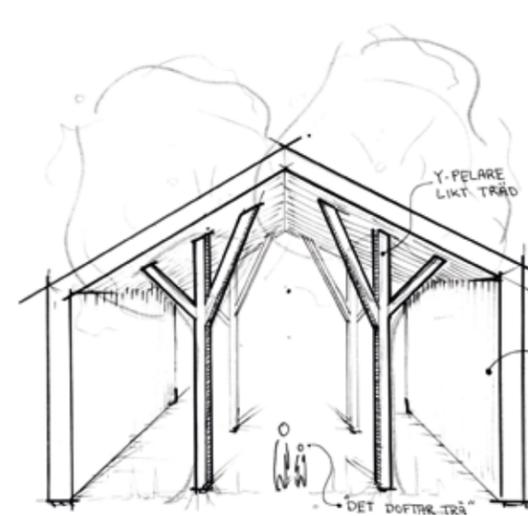
»We looked into how we could incorporate smart, visible structural elements. Luckily, we had excellent discussions with the wood manufacturers about how we could design posts and beams that also created an attractive design, not just in a grid of beams and posts, but with something more going on,« says Philip Hjorth, architect at Liljewall.

Tomas Olsson is the ICA retailer in Lindvallen, running the store with his wife Maria. November's move from a smaller store in the same area to the new premises was mostly about gaining more space. But he concedes

that the wood brings an extra something to the store.

»It's fantastic that it has a wooden frame, and it looks amazing. I suspect ordinary customers don't look up at the ceiling much, but for us it was an important part of the marketing to have a store made of Swedish wood, so this feels excellent,« says Tomas.

He is also pleased to note that the project used wood from different parts of northern Sweden, thus also creating job opportunities in the area. It is very likely that we will soon



Liljewall



Anna Kristinsdóttir



ICA in Lindvallen has an inviting glazed entrance that creates a focal point for the exposed wooden structure, with its treetop feel.

ICA Lindvallen SÄLEN, SWEDEN

ARCHITECT: Liljewall.
CLIENT: Ica fastigheter.
STRUCTURAL ENGINEER: TK Botnia
AREA: 2,100 square metres.
wj liljewall.se

see more wooden stores under the ICA banner.

»We're very proud of the property in Lindvallen, which is quite a milestone for us in terms of sustainability. It's incredibly important to us that we create sustainable buildings over time. We've therefore taken the strategic decision that, where appropriate, our first choice will be to build new stores with a timber frame,« says Sara Haasmark, Sustainability Manager at ICA Fastigheter.

Camilla Gyllestrand at Liljewall has noted a great deal of interest in wood construction and was surprised at the scale of the response to the new store in Lindvallen from all quarters.

»The reception from the industry and the public has been overwhelming. Our large

portfolio includes every possible type of building, but this has beaten all records for media coverage and widespread appreciation,« reports Camilla Gyllestrand.

Lidl's Sales Manager Jens Classon also talks about pride in the new stores, as well as lots of positive feedback from staff and customers alike. The lower carbon footprint is a popular feature, but so is the difference that the wood makes to the feel of the stores inside.

»Personally, I think the stores have a very fresh look. It feels like a totally Scandinavian retail environment. It's light and airy, and everything is infused with consideration for sustainability and the climate, including the material choices both externally and internally. The stores live and breathe sustainability and climate issues,« he says.

Both Philip Hjorth and Camilla Gyllestrand expect to see more wood construction in the future, not just for stores but other projects as well, and many of the decisions are being taken right from the drawing board.

»The climate debate is a constant presence, changing the way we work as architects, and developers also have to decide where they stand early on. It informs everything. We're rarely able to make major changes during »



Lidl Sverige



Lidl in Visby is Sweden's first carbon-neutral building – with wood facilitating disassembly and recycling at the end of the life cycle.

» the late stages – usually things have to be sorted out at the very start of the design process,« says Philip Hjorth, and Camilla Gyllstrand agrees:

»Just a few years ago, climate considerations weren't part of the debate. But society has had a real wake-up call and we've begun to think very differently. There's no going back – we have to move forward, drawing on the enormous benefits of wood.«

Although climate concerns drove all three wood construction projects, both Lidl in Sigtuna and ICA in Lindvallen clearly show that it is possible to design interesting supermarkets that deviate from the classic box-like aesthetic. In Lindvallen, the concept is built around respect for the location and

fitting in among the cottages, forests and ski slopes of the mountainscape. In Sigtuna, the new building is more like a crown jewel of the area – architecture that consciously seeks to stand out and encourage new ways of thinking about supermarkets and what they can be.

Link Arkitektur confirms the view that we are in the middle of a wood revolution, and they have noticed strong demand for wooden buildings, as well as increased production capacity. At the same time, like Camilla Gyllstrand, they are seeing changes in retail and the importance of architecture in developing the stores of the future.

»What I think Sigtuna gets so right is the mix. We don't want just one big supermarket. Instead, we want to combine food with

Lidl Visby VISBY, SWEDEN

ARCHITECT: Link arkitektur.
CLIENT: Lidl Sverige.
STRUCTURAL ENGINEER: Sweco structures.
AREA: 2,440 square metres.
linkarkitektur.com

experiences and shopping, and I believe that mix is incredibly important. It means being more like a market or food hall, and that's going back to our roots to some extent. People want to come together in a larger context, to eat, socialise and do their yoga. The store in Sigtuna forms a unifying hub for the up-and-coming little town, and wood creates a warm, welcoming feel that draws people in, particularly on a dark evening,« says Andreas Lebisch. ☺

Södra Råda Old Church roof

When Södra Råda Old Church burned down in 2001, a well-preserved medieval wooden church with unique murals was lost. Some time later, one of Sweden's most ambitious reconstruction projects was launched to rebuild the church and learn more about medieval construction techniques.

Based on sources such as texts, photos, burnt remains and tool marks, the craftspeople have recreated and used medieval methods for everything from felling the pine (mature wood) in the forest to making components for the build.

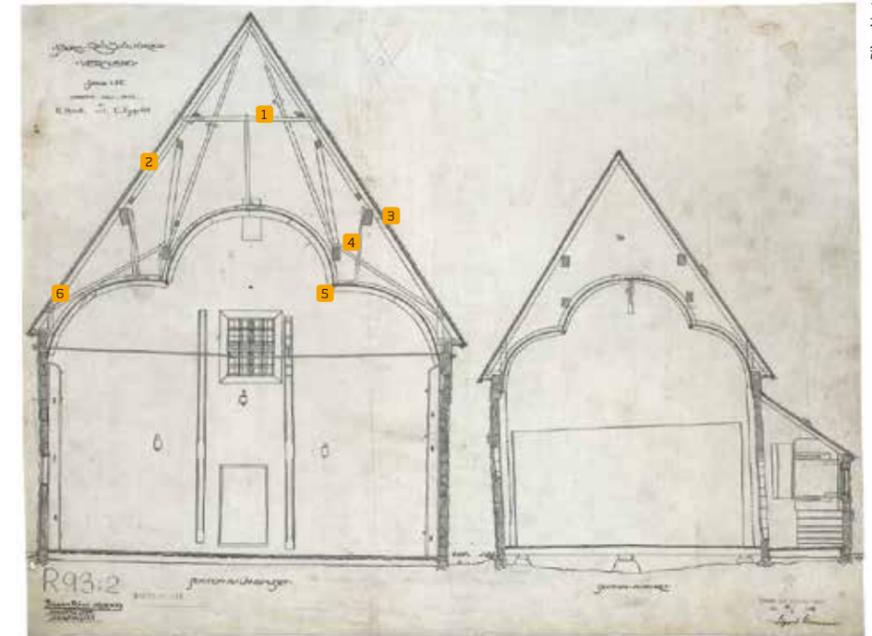
The heritage researchers attached to Södra Råda Old Church initially had trouble understanding the old drawings of the roof. But by looking beyond our modern standards and examining the material that still exists, they discovered a roof structure that was both logical and carefully designed.

One of Södra Råda Old Church's best-known features was its outstanding medieval murals on the clover-shaped vaulted ceiling. However, little attention had ever been paid to the structural design of the roof. The available documentation essentially comprised two drawings from 1909 and a few, contradictory, descriptions. Not a single photo of the loft space has been unearthed.

To start with, we found it hard to figure out the structure. It didn't fit with our modern categories of roof design, where we differentiate between a cut roof, using rafters and purlins, and a roof of trusses.

We made a common mistake and used a modern lens to try and understand what had been created under medieval conditions. But to understand the bigger picture, we first have to understand the individual parts, and for that we had to look at their function in the bigger picture.

There was no getting away from the fact that the roof structure had both trusses and purlins. Before Södra Råda burned down, it was the last remaining church with this



Roof with both purlins and trusses, drawing from 1909.

1. Collar tie. 2. Spar/rafter. 3. Purlin for roof. 4. Purlin for vault. 5. Decorative rope moulding. 6. Spur.

remarkable design. It was probably an unusual solution even in the Middle Ages, but we do know that Hammarö Church had the same kind of roof. It has, however, been replaced over centuries of redevelopment.

The trusses over the nave comprised narrow spars that were a little over eight metres long. Down at the eaves, they had small struts and high up near the top was a collar tie. The spars seemed so thin that we wondered whether the drawings had made a mistake.

The spars were underpinned by two large purlins, which were cut into the end gables. The gables were part of the structural frame, and this is how the loads were able to be channelled down into the frame without pushing out the walls.

The length and weight of the purlins would cause the walls to fail, so the narrow spars were attached to the purlins to help prevent them from sagging. Over the spars, the roof was lined with split boards, as a base for the shingle roof. The lining boards were only around 20 millimetres thick, but combined with the thousands of shingles, they formed a large sheet that stiffened up the structure. The clover-shaped vaulted ceiling was then suspended from another couple of purlins. The decoratively painted ceiling boards were only around 12 millimetres thick. The vaulting wasn't just a load on the roof, however. It was part of the structure.

The more we learned about the design, the more we were struck by the simplicity,

elegance and amazing structural expertise involved. Each little part seemed to have a function in the carefully created whole, and so the features that initially seemed illogical, such as a roof structure that was both cut and trussed, all became clear.

The building had stood for 800 years, so we were a little nervous when engineer Niclas Hansson, with over 20 years of experience in working on medieval churches, came to make the strength calculations under current regulations. Completely changing the specs, with bigger timbers, metal fixings and so on, would have removed any chance of learning more about medieval construction techniques.

To our relief, even based on modern calculation methods, the reconstruction was not impossible. Niclas pointed out the importance of the vaulted ceiling's stabilising effect, something that I had mostly seen as a load-inducing architectural feature rather than a force for stability.

A key conclusion running through the reconstruction work and the results so far is that you have to be willing to deconstruct and question existing knowledge, not least your own. You have to be able to accept your hypotheses being challenged and acknowledge the strength of interdisciplinary collaboration. ☺

Karl-Magnus Melin, woodsman and doctoral student at the University of Gothenburg.

Woodsman's terms

Spar - rafter, one of the components of a truss, often smaller at the top than at the bottom.

Spur - upright part of the triangular bracing at the eaves that also includes a wall plate and spar (rafter).

Gable roof - the triangular part of a gable. The gable comprises the gable roof and the rectangular gable wall.

Collar tie - high bracing beam.

Lining board - a board on which to nail shingles.

Wood grade - we don't always use the finest timber, instead choosing the grade according to the location in the building.

This is an abridged article from the Swedish Association for Building Preservation's craft series. This and over 800 more Swedish articles on

building preservation can be found at byggnavdsvard.se. You can also find out about and become a member of the association.

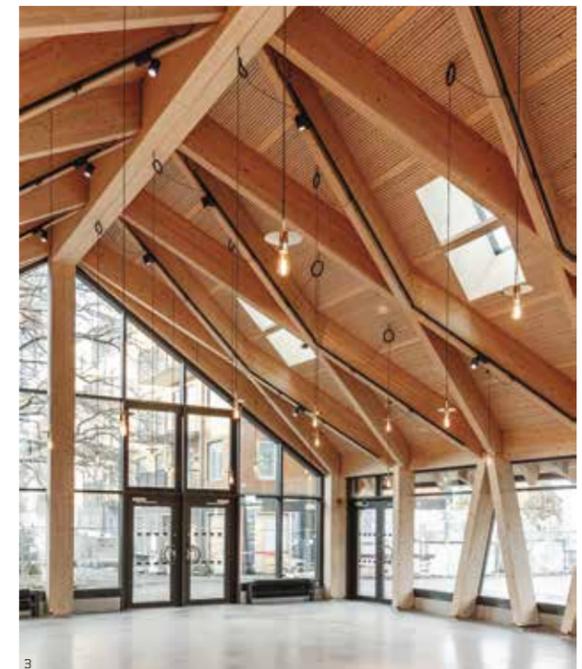
Contact: kansli@byggnavdsvard.se
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The interior and the space create an honest whole

Both welcoming restaurant and communal resource. With its spacious hall, light furnishings and clever details, Magnolia invites gatherings of all kinds.

TEXT Ulla-Karin Höynä PHOTO Rasmus Hjørtshøj



The airy hall, with its high ceiling and 200 square metres of floor space, looks more like a church than the restaurant that Magnolia is – although both offer places for people to congregate in large groups. The architects Kjellander Sjöberg see the space as a kind of marketplace, an assembly hall for different activities in the day and the evening.

Magnolia has a glulam frame, which made it possible to create a welcoming, open room.

»When we go there, we're almost surprised at the wonderful sense of space. Magnolia is an extension to the larger Stora Sköndal complex. The restaurant sits at the heart of the new centre that opens out onto the local square, so it also has a public function,« says architect Stefan Sjöberg.

Magnolia will serve both as a meeting place and as an à la carte restaurant. Other parts of the building also have various communal rooms, making for flexible use.

The extension adjoins the old brick building, and the architects' idea was for the design and characteristic roof shape to be a

comfortable fit with it. There are even glimpses of the old brick from inside the restaurant, although the large expanses of glass primarily face the square, allowing people to see in and out.

»From outside at night, you can see the restaurant and the wood through the glass partitions. And in summer they can be fully opened onto the square.«

The distinctive feature of the interior is the exposed wood and wooden frame. The glulam posts give plenty of freedom to arrange and rearrange the furniture. The high roof is steeply pitched, with an open glulam post-and-beam structure. The V-shaped posts that support the roof run on the diagonal, making them look distinctly sculptural. The posts and roof beams form crosses, creating a striking look that visually connects the roof with its three generous rooflights. According to Stefan Sjöberg, the feel of the room is the sum of its details.

»That and the light coming down through the ceiling are what establishes the ambience. It's a wide room with a simply

1. The room has three rooflights and integrated sofas: one corner sofa and one lining the long wall.
2. The solid ash bar counter is a key feature of the interior, contrasting with the existing brick wall.
3. An open space where posts and beams combine to create a vivid look. The exposed glulam frame is complemented with wooden battens that form acoustic panelling.

Magnolia

STOCKHOLM, SWEDEN

ARCHITECT: Kjellander Sjöberg.

CLIENT: Stiftelsen Stora Sköndal, Stockholm.

STRUCTURAL ENGINEER: Limträteknik.

AREA: 200 square metres.

WJ kjellandersjoberg.se

supported structure, and we're exposing the material – you can work out how it's built. You can see the wood and how it fits together, from the big beams to the finer details.«

The 30 x 30 millimetre spruce battens cladding the ceiling and walls provide a contrast with the monumental roof beams. The wooden cladding around the walls also improves the acoustics. Behind the wooden battens is a cavity that disperses the sound waves.

»With its exposed beams and cladding, the room isn't smooth. The more ribbed the better, as far as sound is concerned. We've done as much as we can to damp down the noise level, and the furniture and people will also play their role.«

The wood is treated with wax, so it won't yellow over time, although it may take on some signs of ageing.

The furnishings are simple. Along the walls are integrated benches in solid oak, with padded cushions in tan leather and accompanying tables. In one corner of the room is a large bar, also in solid ash. The lighting in the room is eye-catching in more ways than one, with focused lighting over

Architect Stefan Sjöberg

»Good lighting is important, as it accentuates the wood.«

every table and black spotlights in the ceiling.

»We also have hooks that can be moved around like sconces on the wall. Good lighting is important, as it accentuates the wood.«

The logistics in the restaurant are quite simple, since there was already a catering kitchen in the old building, which the restaurant will also use. The kitchen is reached via the bar, where the service for guests at the tables begins.

Next to the bar are the restaurant's entrance and cloakroom.

The restaurant and communal building is owned by Stora Sköndal, a foundation that runs sheltered housing and elder care

services on its 80-hectare site. The architectural practice Kjellander Sjöberg was also responsible for refurbishing the catering kitchen and main building.

The idea of using wood came to the architects early on, perhaps unsurprisingly, as they have extensive experience with the material. One benefit of wood, according to Stefan Sjöberg, is the ability to quickly work out the costings. To help them, they brought in a structural engineer who specialises in glulam.

Kjellander Sjöberg has been placing sustainability at the heart of its work for a decade now, and wood is an integral part of their approach.

»We want to help keep energy consumption as low as possible during production, and wood is a renewable raw material. Assembly of the frame was also quick and easy. And in terms of the feel, it's hard to beat wood. It's vibrant, aromatic and wonderfully tactile. Pushing to incorporate sustainable values is often a bit of an uphill struggle, but our client thought sustainability was vital, so the process was easier this time,« concludes Stefan. ☺

Lower carbon footprint with digital help

Minimise the building's carbon footprint on the drawing board. With advanced digital tools, it is possible to do a life cycle analysis and immediately see what effect different choices have on the building's carbon footprint.

TEXT Johanna Lundeberg PHOTO David Valldeby

Conducting a life cycle analysis is nothing new, but to date that task has involved many steps and a lot of manual work, which is both long-winded and costly, states Anna Ervast Öberg, business and project development manager at Folkhem.

»It's always been a laborious way of working, because the different programs couldn't talk to each other, so we've had to manually extract the information we need. It gets expensive, and manual data entry creates the risk of errors, plus we don't have a way of quality assuring the results.«

It is still the most common approach, but now the knowledge and tools exist to work in smarter ways. In conjunction with building the first wooden apartment block in the Cederhusen project in Hagastaden, Stockholm, Folkhem launched a collaborative project with engineering consultancy firm Bjerking to explore how the building's carbon emissions could be reduced. In a digital life cycle analysis, they compared the data for four suppliers of wooden structural frames, and found that by choosing the supplier with the most energy-efficient production, they were able to halve the carbon footprint of the building, equating to a saving of 500 tonnes of carbon dioxide equivalents.

Life cycle analysis

A1-3. **The product phase** encompasses the production of building products and other resources - from extraction of raw materials to transport, processing and manufacture.

A4-5. **The building production phase** covers transport of the building products to the construction site and completion of the building.

B1-7. **The use phase** refers to the use, maintenance, repair and operation of the building, including energy and water.

C1-4. **The end-of-life phase** takes in the processes required to demolish and remove the constituent parts of the building for reuse, recycling or disposal in landfill, once the building has come to the end of its service life.

The program, One Click LCA, links up the design software for architects and structural engineers, for example, with information from the suppliers. This makes it possible to compare the carbon footprint of different materials and suppliers, directly within the design drawing.

»When the architect or structural engineer designs a 3D model, it links to the program, and when they make an adjustment in the design, they can see immediately how it affects the climate, the cost and so on,« explains Robert af Wetterstedt, sustainability specialist at Bjerking and coordinator of the project.

But, he adds, for it to function successfully, the whole industry needs to review how it works digitally. Anna Ervast Öberg draws the same conclusion:

»It's all very well us having the tools to create wonderful 3D models that we then pass on to the building contractor, but that's no good if the material supplier comes along with a paper list - everyone in the process has to participate in the digitalisation process.«

To be able to compare materials, the information about them needs to follow the same standards and be studied on a detailed level. To ensure that the Swedish wood industry contributes to this, Swedish Wood has recently launched the web-based portal traprodukter.se, where each affiliated supplier adds their information in a standardised format. In this initial phase, orderers can visit the portal to access the information, but it will eventually be possible, via the app's user interface, to connect with other programs and databases.

»Until now there has been no kind of standardisation, which means that the analysis results could vary wildly, depending on where you get the reference data from. Using precise data instead of estimates will make the calculations more reliable,« says Christer Green, project manager for digitalisation at Swedish Wood.

Each item in the portal is given a unique identity or global trade item number (GTIN), which is the key to the unique information stored on each item.

»With its unique ID, each item can be traced through its entire life cycle. In the future, you will be able to see exactly what materials are where in the building, and what their carbon footprint is,« says Christer.

The aim of the portal is in part to help improve construction productivity, but also to help construction industry players to produce accurate climate declarations. Certain buildings now have to have an energy declaration, and an increasing number of environmental certification schemes for buildings - including Miljöbyggnad and BREEAM - require a life cycle analysis. Sweden's environmental requirements will also become even more explicit on 1 January 2022. According to a bill developed by Boverket on behalf of the government, all new buildings that require planning permission must have a climate declaration from that date onwards.

»We expect the requirements to be tightened within a few years, so that climate impacts and performance will need to be stated in the declaration, and in 10 years' time there'll be threshold values that cannot be exceeded. That's going to create a need for additional knowledge, technology and data systems,« says Robert af Wetterstedt.

Calculations from Boverket show that the cost of drawing up a climate declaration for a single-family house ranges from SEK 30,000-60,000 (EUR 3,000-6,000). For larger properties, the cost may be higher, but an automated process can cut the cost significantly.

However, the main point is that digitalisation of the construction and real estate sector will enable it to reduce its emissions from the 12.8 million tonnes of carbon dioxide equivalents generated in 2016, according to Boverket, to the vision of zero net emissions by 2045.

»To get our buildings to last longer, we must be fully on top of the materials. We need a better understanding of how we can optimise our projects in terms of the climate and how best to design the buildings. Producing data showing the carbon footprint enables us to make decisions at an early stage that are critical for the building's sustainability,« says Anna Ervast Öberg. ☺



Assembled CLT surface unit at Cederhusen on 12 January 2021. The building has served as a pilot project for reducing the carbon footprint using digital tools in the modelling stage.

» MY MANTRA IS TO BE OF USE TO SOCIETY AND TO PEOPLE. «

He has been in the industry for 70 years and is still much in demand as an interior architect, always with a focus on function. He likes practical objects and is best known for his chairs. Meet Åke Axelsson, who has a vision for circular furniture production.

TEXT Petter Eklund PHOTO Jann Lipka

Åke Axelsson is working on a bookcase, a modular system in pine. His hands scan the wood's surfaces, fits and joints. Biscuits and springs are picked out of boxes and pressed into routed grooves. Spring 2021 marked exactly 70 years since the same hands built a cupboard in mahogany and pear wood. This was his apprenticeship test, a masterpiece by a 19-year-old that was graded a »pass with distinction« at Visby's woodworking school in 1951. That same schoolboy built Malmstens furniture that sold in stores on Stockholm's smart Sveavägen.

»These were quality products that we teenagers were making. I remember the Staken floor lamp, the Sprätthöken coffee table and a cabinet with a Baroque style pediment. That was a challenge.«

This year, Åke Axelsson turns 89. For decades, he has been one of Sweden's most sought-after interior architects and designers of furniture, particularly chairs, which have become his signature.

»My main job has always been interior architect. The chairs came about as part of my commissions,« he says.

But Åke Axelsson has also designed chairs directly for serial production and has been part owner of the Gärsnäs furniture factory since 2003, along with his daughter Anna Klockby and her husband Dag Klockby, who is CEO. The factory makes Åke Axelsson's mass produced chairs, a familiar sight in public environments such as the Riksdag, museums, schools, libraries and restaurants.

»Craftsmanship and industry complement each other and are of equal importance,« he says.

Craftsmanship can also inspire industry to make better, more sustainable furniture and think in longer cycles. Reuse is now an exciting and growing market for the furniture industry, and Gärsnäs is one of the leading companies in the field, with its circular vision to be completely carbon-neutral by 2030. Reuse is going to drive the design of new furniture, which has to be able to be updated and renovated effectively over a long service life. Environmental issues affect furniture design just as much as architecture.

Åke Axelsson and his employee, joiner Daniel Ericsson, work in their own workshop, built a few years ago next to Åke's home in Engarn outside Vaxholm and fully equipped with professional machinery. With his own furniture production and online sales via his website, Åke wants to show that this type of making can work.

»This kind of small-scale production is what we do best. It's too small for a factory, but perfect for us. I call it industrial craftsmanship. I want to lead the way and inspire others,« he says.

Interest in this kind of production is growing against the backdrop of the environmental crisis and the sustainability drive. Customers are looking for local products with a clear identity and good materials, and it all has to be ethically sound.

Åke Axelsson's long love affair with wood dates back to his childhood in Småland in the 1930s and 40s. He had to help out and learn to fell trees and produce timber from them at an early age. He also learned to select wood types based on their properties. Oak for posts and fencing, slow-grown spruce for exterior walls, long-fibred pine for load-bearing structures. All this knowledge that he has collected over the years still comes in handy in the workshop today. He shows off some new step stools that are both light and strong. The lightness is in the alder legs and the strength in the elm steps; timeless know-how that applies as much today as it did in the antique furniture that he has spent many years studying by building it himself. The wood in the workshop is all certified. The wood store contains planks of pine, ash, Gotland elm and walnut. In a corner stand dark planks of Cuban mahogany, sawn in the 1950s and rescued from a factory where Åke managed to grab them before they were thrown away.

Åke Axelsson wishes that woodworking courses would focus more on making practical furniture.

»It's easy to end up with design for design's sake. I'd like to see a clearer emphasis on practical, functional, everyday objects.«

He calls himself a functionalist – not in style, but in terms of function for a better life, creating functional environments and furniture where use is the key. This is an approach that has spurred him on ever since his studies as an interior architect at Konstfack in the 1950s, when the students were trained in a drive to provide all the new homes and public environments with furniture. The emphasis on quality ran deep; only the best was good enough.

»I see it as a responsibility. Being of use to society and to people has been something of a mantra for me down the years.«



Architecture for spiritual peace and mental reflection

Research shows that natural environments have a positive effect on wellbeing, which provided the starting point for Maggie's Leeds – a centre providing support and information for cancer patients. This is the epitome of healing architecture.

TEXT Cecilia Bolter PHOTO Hufton + Crow

Maggie's is a British charity founded by Maggie Keswick Jencks. Her experience of cancer treatment prompted her to develop a new kind of cancer care – providing help in a tranquil setting. With the right support, no patient should need to lose the joy of living in the fear of dying. Maggie Keswick Jencks was a writer, designer and gardener, and it was this that formed the foundation of Maggie's philosophy. The charity now has around 30 support centres, with more on the way. Maggie's Leeds was completed in 2020 at

St James University Hospital. The centre was built on a small sloping plot with a height difference of five metres, which posed one of the main challenges. The solution was a seamlessly integrated split-level building over four levels totalling 462 square metres, with a height of 12 metres and a width of six. The communal areas are visually connected but physically separated by the height variations.

The architecture is designed for spiritual peace and mental reflection. Following Maggie's philosophy and her belief that good design can help people to feel better, natural and eco-friendly materials were used, along with sustainable energy technology. The building's shape and orientation play a major part in creating a pleasant indoor climate, and careful thought went into achieving the best possible solutions.

The building is made up of three volumes, linked by glazed sections overlooking the

1. The boundary between inside and out is intentionally diffuse. The roofs and terraces are filled with plants to compensate for the building occupying the area's last green space.
2. The centre was designed as four split-levels, with branching glulam fins giving the open-plan solution a cathedral-like feel

wild gardens. One of the core ideas was to create a close dialogue between the inner and outer environment and to develop a meditative and calming milieu for the centre's patients. Since the centre was built on the hospital's last little patch of lawn, it was important to reinstate the greenery by designing a series of raised gardens on the roofs for the benefit of everyone around. Together with the gardens at ground level, these frame Maggie's Leeds in an abundance of plantlife.

»Unfortunately the surrounding buildings cast a lot of shade over the gardens, so the choice of planting was particularly important. Minimum care and maintenance was also a crucial criterion,« says Nick Ling, Technical Design Lead at Heatherwick Studio.

A key idea behind the garden concept was to include nods to the region's native woodland, so the environment stimulates positive associations and memories, which are important in the recovery process.

Maggie's Leeds

YORKSHIRE, UK

ARCHITECT: Heatherwick studio.

CLIENT: Maggie's cancer caring centres.

STRUCTURAL ENGINEER: Akt II.

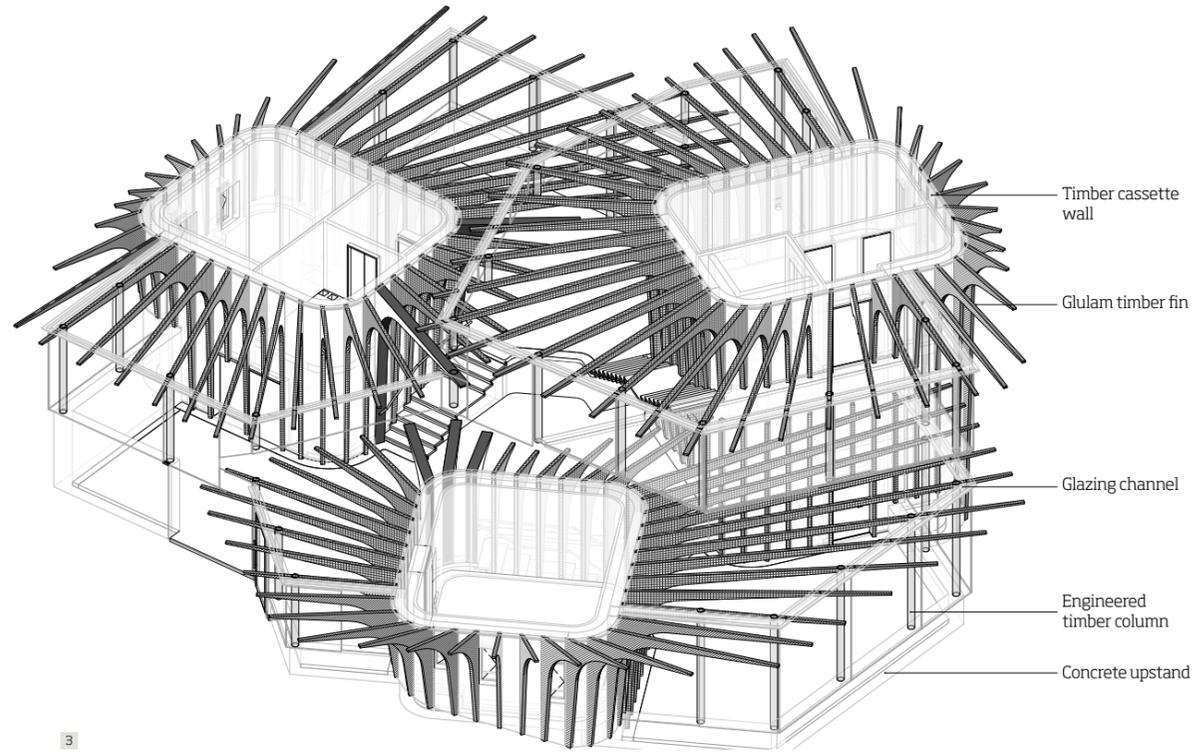
AREA: 462 square metres.

www.heatherwick.com

»We tried to create a setting that would awaken memories and create meditative experiences through architectural and landscape-related features. Visitors to the garden can also see the activity and movement inside the centre, thanks to the transparency of the façades,« says Nick.

The green roofs have a waterproof membrane with insulation and separate drainage systems to avoid damp problems. The roofs and their terraces are made from CLT elements, which in turn rest on glulam fins. The beams that take up the greatest loads have a core of laminated veneer lumber in beech called Baubuche, according to Mathias Marti from Blumer Lehmann in Switzerland, who delivered the structural frame. The internal concrete floor has been ground down a centimetre to expose the gravel and stone aggregate and soften the feel.

Along with the stiff plate of the CLT roof, the volumes are connected structurally to a »



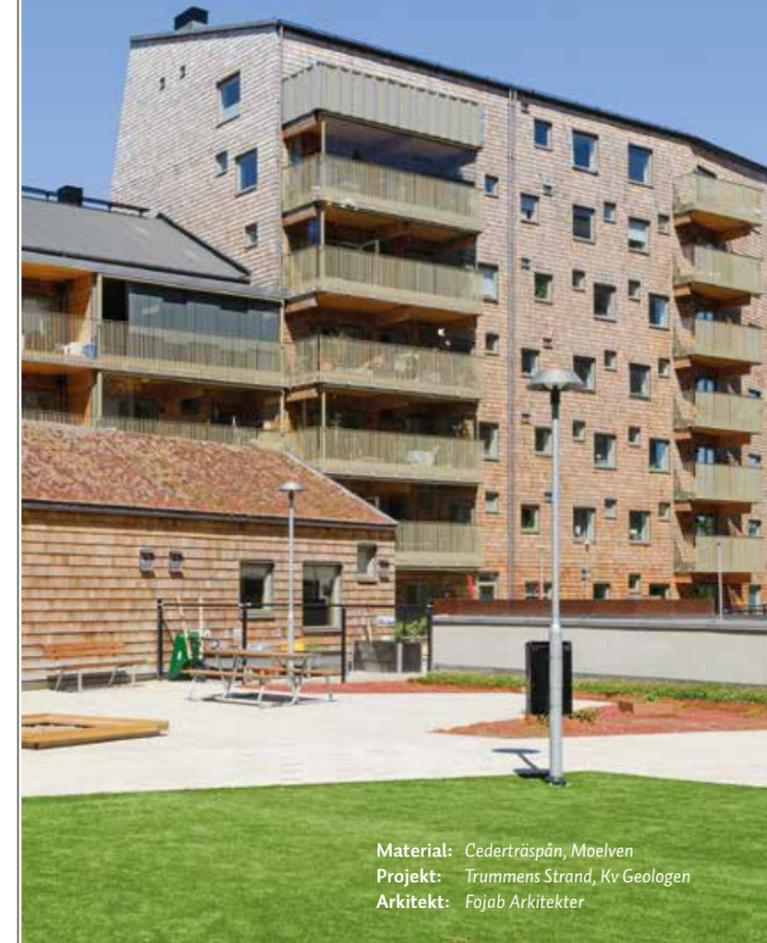
Timber cassette wall

Glulam timber fin

Glazing channel

Engineered timber column

Concrete upstand



Material: Cederträspån, Moelven
Projekt: Trummens Strand, Kv Geologen
Arkitekt: Fojab Arkitekter

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» load-bearing unit that distributes the loads to the glulam fins. The load-bearing elements are also a key part of the design concept.

In the communal spaces with higher ceilings, these elements echo the structure of a Gothic cathedral – a stylish design that accentuates the organic forms, with the enclosed counselling rooms ranged around the communal areas for social interaction and activities.

The spatial feel is both dynamic and intimate in an environment of togetherness and inclusion. Within the open-plan design, the counselling rooms and other private areas are enveloped in walls made of wooden studs with sound insulation and stabilising OSB panels on both sides. The rigidity of the OSB means that the windowless volumes, like

oversized flowerpots, make an important impact on the building's stability.

The link between inside and out, between architecture and landscape, between closed and open designs in rooms full of natural materials, encourages both private meditation and social interaction.

The visual statements vary at Maggie's Leeds, but positivity is a running theme for the centre's visitors, with the warm atmosphere having a major impact on the overall experience. From a design perspective, details that might seem small have a significant effect on the architectural quality. For example, all the lighting in the building is indirect, concealed behind mouldings, along the edge of steps and in shelving. A key aim was for the

3. Structural axonometric projection.

4. The centre is built on a narrow, sloping plot. To accommodate the height difference, it comprises three connecting volumes.

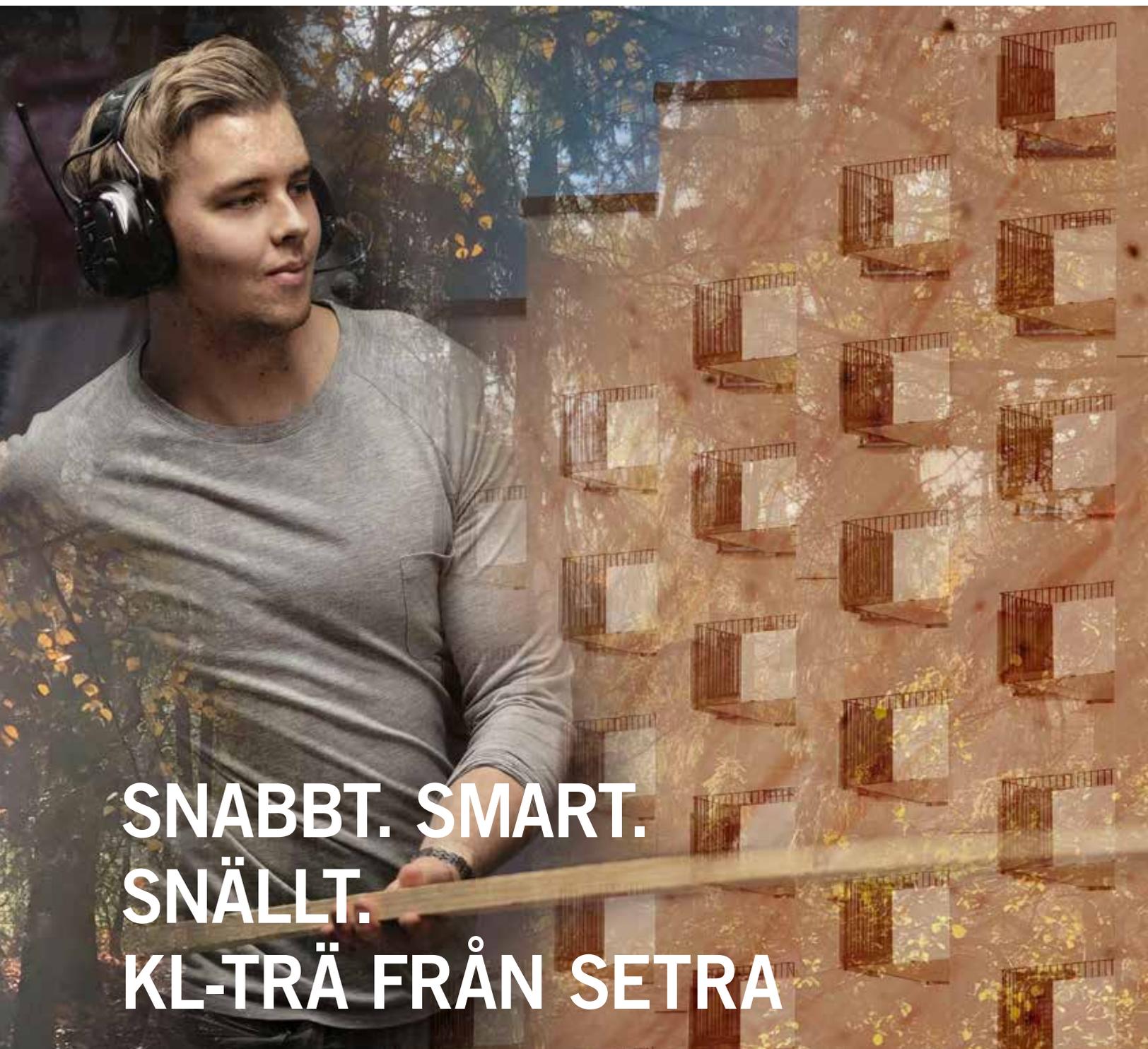
5. Detail of glulam fins, where vertical and horizontal meet.

6. The design is intended to help patients feel better, with great emphasis placed on making the interior feel like a home rather than a clinic.

interior of the centre to be like a slightly upmarket, homely environment.

»We chose to use an ordinary table lamp over spotlights to minimise any potential associations with institutional settings, so visitors could feel at home,« says Nick Ling.

Maggie's Leeds is an important and interesting project, where the architecture conveys a humanist approach. The centre is a meaningful complement to regular cancer treatment, aimed at delivering quality and creating joy in life, with the environment playing an important role. Green views and calming, well-planned architecture using natural and healthy materials have become the cornerstone for an organisation that provides social activities and supportive counselling. ☺



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