

trä!

A MAGAZINE OF INSPIRING ARCHITECTURE
FROM SWEDISH WOOD » ISSUE 3 » 2021



IN THE HEART OF PARIS

Elegant arches and grandiose volume

**BOLD EXTENSION
WITH A VIEW**
NEW HEIGHTS VIA
LOCAL COLLABORATION
**SECRET WORLD
BEHIND THE FAÇADES**

TRÄ MEETS
Maria Block

KNOWLEDGE
Building preservation
for sustainability

Det nya normala.

När Holmen förvärvade Martinsons var det ett litet men värdefullt steg närmare en hållbar framtid, med positiva effekter för både oss som företag och vår omvärld. Tillsammans är Holmen och Martinsons cirkulära och bildar en stark, långsiktig värdekedja. Den inkluderar allt från framtidssmart förvaltning och förädling av skogen, till utveckling av nytänkande byggsystem i trä som säkrar levnadsmiljöerna för kommande generationer. Ett bra exempel på våra lösningar i mötet mellan natur och teknik är Sara kulturhus i Skellefteå, med 20 våningar i trä från regionens skogar. Det är ett av många bevis för att vi kan bygga en hållbar framtid med naturen som grund och att trä som materialval är det nya normala.

 **martinsons**
En del av Holmen

SARA KULTURHUS I SKELLEFTEÅ

Arkitekt: White Byggherre: Skellefteå kommun Totalentreprenör: HENT Sverige Stomleverantör/montör: Martinsons
Modulleverantör: Derome Konstruktör: TK Botnia

trä!

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Jonas Westling/Martinsons

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New heights in Skellefteå

Sara Kulturhus, one of the tallest wooden buildings in the world, has changed the cityscape in Skellefteå. The project is all about local, from the raw material to the workforce and technology.

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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

Is the wood running out?

HUDIKSVALL, SWEDEN It can hardly have escaped anyone's notice that the market for wood products has become both hot and much discussed recently. Sharp price rises and a demand that has outstripped available volumes have featured a great deal in the media. How did we end up in this situation in a country that is 70 percent forest?

To find the answer, we need to go back to last year. When the full force of the pandemic hit in spring 2020 and several countries around the world shut down, sawmills everywhere, like many other industries, made the only reasonable assumption – that demand would drop. Decisions were therefore taken to cut production over the summer to maintain equilibrium in the market. In hindsight, we know that in fact global demand for wood products increased. Economies around the world were stimulated by government support to stave off a financial crisis, and people chose to improve their homes instead of going on holiday. And we are still experiencing the after-shocks of the global shortage in wood products that occurred in the summer of 2020.

A number of misconceptions appear in the public debate, for example that the lack of wood products in Sweden is due to an increase in exports from Swedish sawmills. That is not the case. In normal circumstances, around 70 percent of Swedish production is exported, which is unsurprising since Sweden is one of the largest producers of wood products globally. Over the past year, Swedish sawmills have actually supplied the Swedish market with a larger proportion of their output than normal. Exports to China and Egypt in particular have fallen steeply. Exports to the USA are up slightly, but it should be remembered that this market, the world's largest consumer of wood products, only accounts for 5 percent of Sweden's total exports.

During the pandemic, many other materials and products have also been hit by similar disruptions to their supply chains, leading to price rises. Taking a longer view, the price of wood products has, in fact, seen quite modest growth compared with other building materials. Now that the sawmills are back up to speed, the market will gradually find a new equilibrium. We should continue to ramp up our construction in wood, for the climate and for more efficient urban development. Sweden's reserves of this renewable raw material are a fantastic resource that we should make the most of and be proud of. It is not going to run out.


Mathias Fridholm

Editorial



Nicasa & Partners

The conical roof structure gives the room an airy and cosy feel, with the paired-up tree trunks adding extra character.

Paired poles make strong connection

OBJECT Poko Poko
ARCHITECT Klein Dytham
STRUCTURAL ENGINEER Tectonica

TOCHIGI, JAPAN In the highlands of Japan's Tochigi prefecture, two hotels occupy the same plot, but far enough apart to have their own identities. The owner's desire to create a more coherent feel resulted in a new bridge and new paths that make it easier for guests to enjoy the whole site on foot. However, the three new connected volumes sitting in the landscape, opposite the hotels, have been the biggest unifying force. With their conical shingled roofs, they look like something from a fairytale.

Inside, too, the shape of the roof is a prominent feature, with its exposed structural frame in

locally grown pine. Pairs of slender debarked tree trunks, joined by short dowelled logs, create a regular pattern on the high ceiling. The pairs of poles sit on a ring of steel that runs around the building and are anchored in place by a smaller ring at the top, which also forms a rooflight. A layer of plywood sheets fixed behind the poles helps to stabilise the structure.

Each volume has its own function: shared dining activities, relaxation area and play area with a large climbing net attached to the roof, encouraging the children to climb all the way up. « **wj** klein-dytham.com



Marcello Mariani

Pattern for varied character

VALLE D'AOSTA, ITALIEN In the Italian Alps, Enrico Scaramellini has created a prototype for a small, neat little holiday home with a compact design and enough space for four people. The design combines the tradition of the log cabin with the modernity of CLT in the structural frame.

OBJECT Prototype house
ARCHITECT Enrico Scaramellini architetto

The aim is to understand how a single element can be used in different ways to lend a certain character to a building, depending on which repetitive pattern is used on the exterior. It also means that each house can be given its own distinct look: the prefabricated CLT modules form the base of the building, but the upper half of the façade has been left more to the imagination of the architects, who can create different patterns for their clients. This will make every building unique while still giving a sense of unity to a developed site. «

wj es-arch.it



Thomas Zear

The yoga pavilion's rotating screens can be opened or closed depending on how exposed users want to be.

Open space for inner peace

STOCKHOLM, SWEDEN A trip to India led to a yoga pavilion being built in Vasaparken. A local yoga fan returning from her travels felt there was something missing from the Stockholm park, so she submitted her idea to the City of Stockholm in the form of a citizen's proposal. Now it has become a reality, raised on a rocky outcrop to give a little distance from the livelier parts of the park, while preserving the surrounding greenery.

The structure comprises a simple and exposed roof made primarily from Swedish heartwood pine treated with linseed oil. The open roof of widely spaced battens will soon be finished with an awning for additional protection from the weather. Sections of the pavilion are lined with rotating screens – also made of battens – placed so that those practising their yoga can choose how much they want to be screened off. The pavilion is open to anyone, whenever they feel the need for inward reflection, but you have to bring your own yoga mat. «

OBJECT Yoga pavilion
ARCHITECT Nyréns arkitektkontor
JOINERY Linjon group

wj nyrens.se



Maira Ayrescha

The round, open form of the modular building offers both shade and views, all with a local perspective.

Shop with spectacular views

MONTEIRO LOBATO, BRASIL In the Brazilian countryside, facilities are often few and far between and the residents of Monteiro Lobato, about 120 kilometres north-east of São Paulo, used to have to travel 20 kilometres to get to their nearest supermarket – which is why a combined restaurant and grocery store has been built here to serve the locals and the tourists in the area.

The building stands 1150 metres above sea level and, with its rounded, open form and

wraparound terrace, it offers visitors spectacular views of the surrounding landscape. The structure stands on posts so as to have as little impact as possible on the ground. Being made up of modules, the building can easily be extended or made smaller, as future needs dictate. Only local materials have been used, and since much of the building has no walls, it enjoys a natural airflow supported by a central opening that draws the air up and out – a kind of termite ventilation – helping to create a cooling effect along with moisture evaporation from the neighbouring kitchen garden. «

OBJECT Restaurant & shop
ARCHITECT Metamoorfose
STRUCTURAL ENGINEER Carpinteria

wj metamoorfose.com



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The family home's shape offers privacy and close contact with nature. The interior is treated with soap and lye.

Communal core shapes design

FYN, DENMARK One of Denmark's first private homes to be built in CLT stretches across a plot on the island of Fyn. Y-shaped, with all the communal spaces placed around the core of the building and more private areas further out in each alcove, the house is designed for a family of two adults and four children to be able to shape the way they live. However, the building's three arms also help to vary the character of the plot by dividing it into three smaller areas, all with different functions depending on the direction they face: sun terrace on the south side, a sheltered kitchen garden to the east and a more playful garden to the west. The low building is clad in sheet metal that has now begun to turn a rusty red.

OBJECT Villa Korup
ARCHITECT Jan Henrik Jansen arkitekter med Marshall Blecher
STRUCTURAL ENGINEER Møller & Jakobsen

Internally, the wood has been left exposed and treated in the classic Danish way with soap and lye, which gives a soft and durable surface. Prefabricating the CLT panels in Baltic spruce meant that the building could be assembled in just three days. « [wj|janhenrikjansen.dk](http://wj.janhenrikjansen.dk), marshallblecher.com

Optimised rebuild

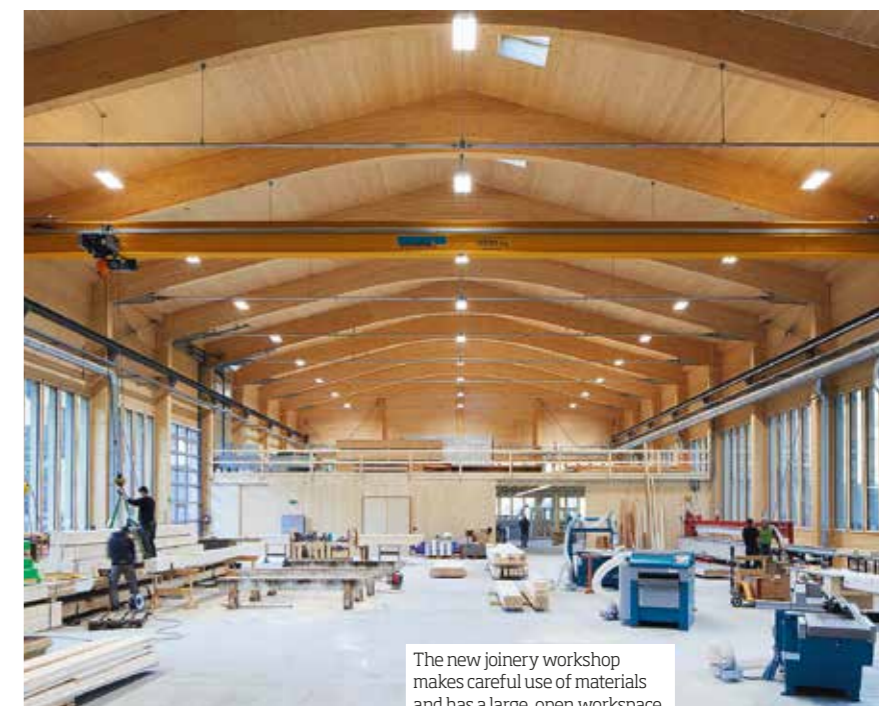
GLARUS SÜD, SWITZERLAND When a fire destroyed a joinery workshop in the Swiss village of Matt, the rebuild became an opportunity to reconsider the building's design before it was reinstated.

The shape of the building follows the parameters of the previous steel building, but the architects and structural engineers have refined the function and material choices, so that it can now also show visitors and customers what can be achieved in wood.

OBJECT Joinery workshop
ARCHITECT AMJGS architektur, Marti architekten
STRUCTURAL ENGINEER Andreas Gudenz

The roof comprises 16 gently curved glulam beams, resting on posts in the same material. Steel ties stabilise the structure. The glulam posts are also visible on the exterior of the over 70 metre-long building, so the façade is elegantly broken up by posts and windows. The façade's horizontal cladding is larch, complemented by roughly cut spruce. The eaves provide protection for the untreated cladding, while solar panels are fixed to the roof.

The services in the office area are finished primarily in spruce, larch and oak. Everything is untreated except the parts subject to the greatest wear, such as doors and flooring. « [wj|amjgs.ch](http://wj.amjgs.ch), martimatt.ch



The new joinery workshop makes careful use of materials and has a large, open workspace.

Reused arcade

MALMÖ, SWEDEN Architectural practice Förstberg Ling designed Sweden's 150 sqm pavilion for the London Design Fair two

OBJECT ssp pavilion
ARCHITECT Förstberg Ling

years ago, creating a temple-like structure in pine, with welcoming openings and a warm, light feel. The whole thing comprised prefabricated modules, to ensure that the pavilion could easily be dismantled, moved and reassembled. Last spring, the time came for it to be raised again, this time in Malmö during the Southern Sweden Design Days, an exhibition that was both physical and virtual.

The oversized pillars and beams form an arcade of twelve rooms, of equal size, around a central atrium. The square pillars are set diagonally, with no thresholds between the spaces, inviting visitors to find their own path in and out of the different rooms. The pavilion has now been dismantled once more, but is ready and waiting to be used again and again. « [wj|forstbergling.com](http://wj.forstbergling.com)

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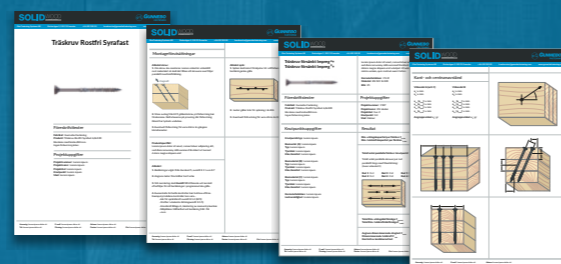
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Sara Kulturhus, Skellefteå
Foto: Martinssons

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FLERA ÅR AV UTVECKLING ligger bakom Masonite Beams Flexibla Byggsystem. Ett byggsystem med lättbalksstomme med stor arkitektonisk frihet vid byggande av villor, industrier, påbyggnader och höga trähus upp till åtta våningar.

MFB ACADEMY är nätverket med aktörer som alla bygger med Masonite Beams Flexibla Byggsystem. Idag består akademien av partners med expertkompetens inom ljud, brand, energi, arkitektur och konstruktion. Våra experters långa erfarenhet säkrar varje projekt från start till mål och ser till att resultatet blir kostnadseffektivt och hållbart.

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www.masonitebeams.se



The Gotland houses are inspired by old barns, refining the idea with regularly placed glulam posts.

Robust frame defines low-key homes

GOTLAND, SVERIGE Vid vattnet, strax söder om Slite på Gotland, ligger Boge Friggars. Här står fem fritidshus på plintar, alla på lagom avstånd från varandra för att både få avskildhet och ett sammanhållet grepp mellan tallar och björkar. Arkitektens tidlösa uttryck är inspirerat av äldre tiders timmerhus och lador, med exponerade limträpelare som ramar in exteriören, placerade med ett centrumavstånd på 4,8 meter. Ovanpå dessa vilar ett primärt och sekundärt takbjälklag av limträ, och fasadpanelen är av lärk. Allt synligt trä är obehandlat, utifrån tanken att det gotländska klimatet ska få sätta sin prägel på husen. Det flacka taket, som är klätt med takpapp, bidrar till byggnadernas lågmälda ton och låter dem än mer smälta in i landskapet.

OBJECT Boge Friggars III
ARCHITECT Scott Rasmusson
Källander
STRUCTURAL ENGINEER
Mahe projekt
[wjsr-k.se](http://www.wjsr-k.se)

Varje byggnad har, utöver ett mindre gästutrymme, en boarea på cirka 125 kvadratmeter med en solid och en öppen del. Den solida består av hemmets privata delar, som sovrum och badrum, medan den öppna delen innehåller gemensamhetsytor som kök, matsal och vardagsrum. «

Sauna and storage under one roof

SMÅDALARÖ, SWEDEN »What could be more perfect than a traditional boathouse?» thought Metropolis Arkitekter, when tasked with designing an outbuilding to house a sauna, workshop and storage for boat equipment and canoes in the Stockholm archipelago. The structure is intentionally exposed to show how they have contained all the various functions in a simple box beneath the large, projecting roof. The gap between building and roof has space for canoes and paddles, and the oversized eaves keep everything dry. The double-glazed windows are glued onto the façade without frames and secured in place with brass fixings.



Simple as it is, this tiny building houses a sauna and a workshop, with space for boat storage under the roof.

OBJECT Saunav
ARCHITECT Metropolis arkitekter

The building is positioned on a rocky slope that drops away towards the sea, exposing it to some extremely strong winds at times, so the structure uses self-tapping screw joints. In the

autumn, the sea reaches all the way up to the posts at high tide. The structural frame and façade are made of untreated pine that will turn grey over time and merge in among the rocks, giving the building a little extra archipelago character. «
[wjmetark.se](http://www.wjmetark.se)

Anna Sundström

Bror Sundqvist, Operational Manager
Woodcenter North, Luleå University of Technology

Could wooden interiors replace medicine?

MALMÖ, SWEDEN You may have heard about Japanese shinrin-yoku, forest bathing to promote health, which has now also reached Sweden. A key aspect of this is the trees and their effects. So shouldn't having wood indoors also be beneficial for health and well-being? A lot has been said about the positive associations with wood, and during the pandemic, with its periods of isolation and homeworking, the importance of our indoor environment has become particularly apparent.

Previous research by the Norwegian University of Life Sciences has included studying »natural features« at Trondheim Hospital, where wood cladding was installed in the patients' rooms. There was a clear reduction in the patients' stress levels, leading to lower blood pressure and heart rate, but the most remarkable finding was that patients in rooms with wood cladding were discharged earlier than those who stayed in rooms with just painted walls. However, the results were not entirely conclusive.

In 2018 I began discussions with Swedish Wood and others about the interesting results from the Norwegian studies and the findings from earlier research. We quickly agreed that this needed further exploration, and this has led to the pilot project Wooden features in patient rooms, which begins in September at Skellefteå Hospital's Orthopaedic Clinic and will continue until summer 2022.

One patient room will be fitted out with cladding made of three-layer, edge-glued pine when around half of the wall space and this will be compared with a painted patient room to ensure as clear a comparison as possible. The choice of both rooms will be voluntary for patients with hip fractures. The patient rooms are otherwise almost exactly the same: the same size, on the same floor and with windows facing south. The idea is that the three-layer, edge-glued pine panels will interact with the ambient climate and create an enhanced feeling in the room, affect the spatial environment, reduce the occurrence of harmful microbes, encourage more rapid recovery and give the patient a more positive experience during their stay. It will be particularly interesting to see whether the cohort of patients in the wood room generally spend less time at the clinic than the cohort in the painted room.

The aim of the pilot project at the hospital in Skellefteå is to continue establishing the real-world links between wooden buildings and their effect on humans. There are numerous reports and publications pointing in a positive direction, but additional scientific studies are important.



Chronicle



WAREHOUSE IN SALT-TOLERANT MATERIAL

PHOTOGRAPHER
Antoine Richez

OBJECT
Saltlager

ARCHITECT
Goffart Polomé
Architectes

STRUCTURAL
ENGINEER Ney &
partners Wow

HOUFFALIZE, BELGIUM Wood is resistant to neutral salts, which is why buildings for the storage of salt tend to be made of wood. When a Belgian salt distributor needed a new warehouse, the choice of material was obvious, and the architects chose to reinterpret the traditional barn in a modern way.

With its warmth and softness, the wooden structure is also a counterpoint to the coarse, hard surface of the salt, as well as reflecting the region's agricultural and forested landscape. At the base, three of the building's sides are clad with CLT panels that lean

against triangular supports, also in CLT. Every fourth triangular support also features a glulam post reaching up to the large-scale glulam roof trusses.

The fourth side has been left open, so that a tractor can easily drive into the 430 sqm space to collect and deposit the salt, all protected by generous eaves. «

- The upper part of the building is clad in corrugated plastic that lets in light and lends a serious tone.

- In the low, open landscape, the building's silhouette provides a landmark for the region.

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**DARING
FORMS
ABOVE
A MALL**

In downtown Umeå, the block occupied by Kv. Forsete and the Utopia shopping mall has become its own little city within a city. The latest addition is a bold architectural addition in CLT that winds up onto the roof like a snake. »

The wooden upward extension houses a total of 49 apartments. The whole building is its own little microcosm, with housing and many public facilities.

TEXT Sara Bergqvist PHOTO Jason Strong



The building's sinuous structure rises four storeys at the rear and reaches over the front section, giving everyone views towards the river.

Umeå is growing at a great pace. By 2050, the aim is for today's population of 130,000 to have leapt to 200,000. And that is by no means over-ambitious. Umeå is one of the few cities in Sweden to have experienced consistent growth over the past 50 years, while its industries and higher education are expanding more than ever. In line with this, more housing needs to be built and the city more densely developed – and the local authority is keen to do this in a sustainable and appealing way. One element of this involves joining the current city centre with the university campus just 1.5 kilometres away. The property company Balticgruppen is involved in several such major projects, one of which is the development of the whole block comprising Kv. Forsete, the Utopia mall and the Glitne housing cooperative.

»We want all of our projects to add something to the city and help to make Umeå a better and more liveable city. The idea of this central block has been to build a separate little city within the city, offering shops, restaurants, a hotel and a school, with the apartments at the top as the jewel in the crown,« explains David Carlsson, CEO of Balticgruppen, which owns the Utopia mall and commissioned the new housing.

The task of designing the new addition went to the award-winning Danish architectural practice BIG, Bjarke Ingels Group. The notion of building the extension in wood came at an early stage.

»When building onto an existing structure, it's important to choose materials that keep the weight down and where possible to pre-fabricate as much as you can, to make the actual construction process as fast as possible. Sustainability was another important reason for choosing wood,« comments David Zahle, lead architect and partner at BIG.

The more he studied the existing building, the more fascinated he became, with the many different functions in the building and the fact that it has been added to over such a long period, using so many different styles.

»The building had its own historical tale to tell and contained all sorts of different geometric shapes – amorphous, round, triangular and straight. We wanted to add another layer to the history by introducing a strong new design that would make its mark on the building, rather than just continuing with what was already there,« says David Zahle.

Another important quality he wanted to embrace was all

about the views. By raising the rear section and giving the building the shape of a wave, or of a snake curling around on itself, all the apartments have superb views towards the horizon. The extension thus rises four storeys at the back, but only two storeys at the front. All the apartments except the studios range over at least two levels.

»This way, there are no first and second-class apartments. Everyone has the same great views. At the same time, the design of the building allows for a great deal of variation inside the apartments, reflecting a diverse range of preferences. This gives everyone the chance to find their dream home, instead of going with a compromise that many people are fairly happy with, but no one is fully in love with,« says David Zahle.

Building extensions in tight city centre locations is always a challenge. In this case, there was an extra challenge in the fact that the shopping mall had originally comprised three different buildings, with their own foundation systems, which were later merged together.

»The different foundations were a floating slab, old-style

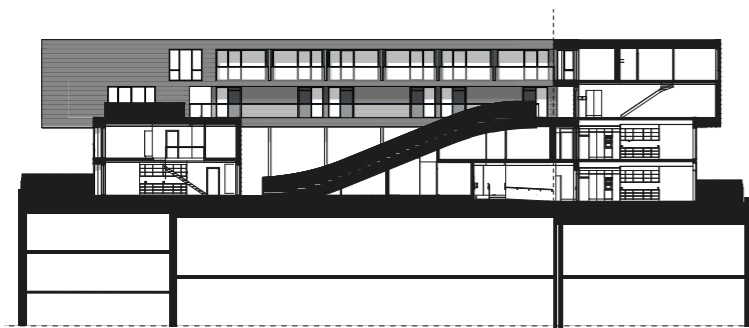
Architect **David Zahle**

»**WE WANTED TO ADD ANOTHER LAYER TO THE BUILDING'S HISTORY.**«

piles and more modern piles. Ground conditions and the added weight of Glitne mean all these foundations might move to different degrees. To absorb these movements, an expansion joint runs through the whole building,« says Arno De Ryst, lead architect for the project at Link Arkitektur, which is responsible for the internal parts of the building.

The whole upward extension has been placed directly on the roof of the existing building, only opening it up where necessary to insert a lift shaft and various connections.

»To centre the loads, we first installed a grid of steel beams. This provides a kind of level zero onto which Glitne is built, and then comes the actual wooden structure in CLT,« Arno De Ryst explains. »



Sales Manager **Stig Axelsson**

» **CLT MAKES THE BUILDING
AROUND FIVE TIMES LIGHTER.** «

» The whole carcass has floors and walls in CLT, 120 millimetres thick in the walls and 150 millimetres in the floors.

» In total, we've used 1,500 cubic metres of CLT on this project. Using this material makes every cubic metre around five times lighter than the equivalent in concrete,« says Stig Axelsson, Sales Manager at Martinsons, which is responsible for the whole wooden structure.

A couple of places needed reinforcing with a thin steel frame, in order to structurally handle the challenging architecture, with its protruding section called "the eye" and the curved section. Otherwise, all the load-bearing parts are wood.

» The roof comprises prefabricated lightweight cassettes that could quickly be lifted into place and made watertight,« says Stig Axelsson.

The building also has several exposed elements in wood. Internally, the floors, inner doors, steps and handrails are made of ash. On the outside, the floors in the access balconies, the apartment balconies, the screening walls between the balconies and the stepped seating in the shared courtyard are all clad in larch. The surfaces outdoors are clad alternately in larch and slate – the latter in the places where there is underground heating.

» The façade is made of black aluminium, with a gold-coloured aluminium trim around the windows. The roof is lined with sedum on the upper parts to handle rainwater and with grass on the lower sections that are visible from some of the apartments,« says Arno De Ryst.

The spacious balconies and the lush communal courtyard, combined with the location high above the buzz of the city,

The design, with no two sides the same, creates superb variation between the apartments, with all but the studios occupying more than one floor.



create a quiet, almost rural oasis with amazing views across Umeå. The site also boasts a communal spa with a relaxation area, sauna and hot tub. From all the apartments – which range from studios to three bedrooms with a number of different configurations and sizes between 34 and 130 square metres – the lift whisks residents down to everything else on offer in the building.

» This means you can head down to the gym or the shops without even having to put on your coat,« adds Peter Norrman, who is chairman of the new Glitne housing cooperative.

He and his wife live in a two-bedroom apartment of 80 sqm, having moved here from a house just outside the city.

» We were really taken with the large outdoor space. It's fantastic to be able to sit, undisturbed, on this large, private

Glitne

UMEÅ, SWEDEN

ARCHITECT BIG and Link arkitektur.

CLIENT Balticgruppen.

STRUCTURAL ENGINEER Sigma Civil.

WOODEN STRUCTUR Martinsons.

AREA Approx. 4,700 sqm.

big.dk, linkarkitektur.com

terrace and still be in the heart of the city. And the architecture is something really special. An 18-year-old who visited us thought it was just like living in Manhattan,« concludes Peter Norrman. ©



Locally produced arts centre puts Skellefteå in the spotlight

The architecture is based on repetition and on visitors feeling at home, but it also applies unique solutions, such as a trussed roof with steel ties.

With 20 floors, Sara Kulturhus in Skellefteå is one of the world's tallest wooden buildings, reaching 75 metres into the sky. Trä! got a first look at the project that is almost finished. The building, which has changed both the skyline and the view of what can be achieved in wood, is the result of real teamwork, with everyone sharing their experience and expertise. Most of the raw material and construction technology for Sara Kulturhus has also been sourced locally. »

TEXT Katarina Brandt PHOTO Jonas Westling/Martinsons

Skellefteå is currently expanding in every direction, with numerous activities under way to take the city into the future. New housing, workplaces and infrastructure are all taking shape, and crowning it all is the city's new landmark, Sara Kulturhus. While Northvolt's much talked-about battery factory covers the equivalent of 40 football pitches, making it the largest of its type in the world, Sara Kulturhus is instead looking to the heavens and a place among the world's tallest wooden buildings.

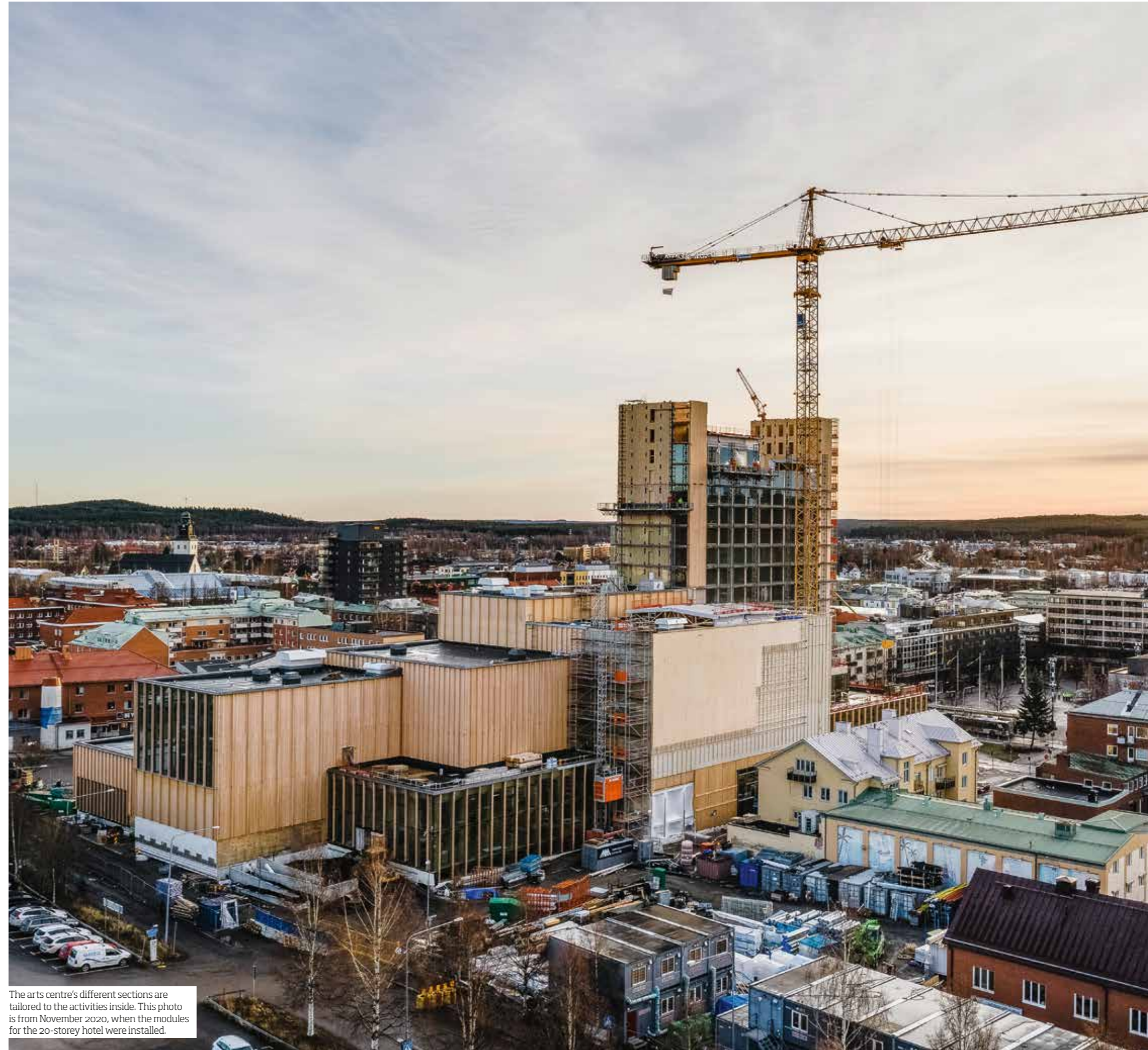
It is worth stating at this point that Skellefteå is no stranger to wood construction. The city has a long history of projects and collaborations that have paved the way for Sara Kulturhus. The municipality has had a wood construction strategy in place since 2014, and in total there are around 50 reference projects built partly or entirely in wood. Of course, the key to this is the local availability of raw material, which means that the wood tradition has been literally cultivated for decades. However, the most crucial success factor is the region's unique well of expertise – from education and research to companies that operate along the whole chain from forest to construction site. The commitment to building in wood has thus brought mutual benefits, with all the stakeholders sharing their knowledge and the municipality allowing the resulting insights to be tested in practice.

Culture and tourism have also been given an integral role in the development of Skellefteå towards its target of 90,000 inhabitants by the year 2030. In June 2015, the city council therefore agreed to build a new arts centre. An open architectural competition was launched in November of that year, attracting 55 entries. White Arkitekter won with their design »Side by Side«.

»We wanted to break new ground and quickly saw the potential to design a tall building in wood. The fact that Skellefteå is a member of Wood City Sweden and has its own wood construction strategy meant that there was a clear desire to build in wood and a willingness to push the boundaries. We were dealing with a client that had experience of projects in wood,« says Robert Schmitz, lead architect at White.

Sara Kulturhus now occupies a whole block in central Skellefteå, between Möjligheternas Torg and the city's emerging transport hub. The name is inspired by one of Sweden's great authors, Sara Lidman, who was born and grew up locally.

The new arts centre contains six stages, two galleries, a library and a foyer that is set to become a natural meeting place, with its open and inviting layout and its striking steps. Four core operators in the fields of literature, performing arts and visual art have moved in – Västerbottensteatern, Skellefteå Konsthall, the City Library and Museum Anna Nordlander, MAN. In addition, the building houses The Wood Hotel with its 205 rooms, restaurants, spa, gym and conference facilities, which will help to meet demand as tourism grows in the region. In terms of both shape and size, the various parts of »



The arts centre's different sections are tailored to the activities inside. This photo is from November 2020, when the modules for the 20-storey hotel were installed.

» the building are specifically tailored to the different activities and operations. At the same time, the new arts centre has an emphasis on flexibility, enabling the premises to be easily adapted to future needs.

»As a client, the municipality has been extremely involved, committed and motivated, which has been crucial to the project's success. There was never any discussion about reining in our ambitions and turning this into a concrete block, which has happened on other projects,« says Robert Schmitz.

Initially, the main task was to find the right structural solution for the building, and this is where White's partnership with the structural engineer Florian Kosche proved particularly helpful. Together, they developed two different structural systems, one for the arts centre and one for the tall hotel section.

»We settled on a good way of working with Florian that allowed our concepts to be developed using different types of wooden structure. The biggest difference between the competition entry and the finished building is that we have wooden floor structures in the arts centre and not a composite of wood and concrete, as we first suggested. Concrete is now only present in the ground and the basement, and as reinforcement on one of the floors that distributes the forces in the steel trusses on level five. We also have concrete floors on the top three levels, which rest on wooden posts and help to reduce oscillations,« explains Oskar Norelius, another of the architects on the team.

The lower section of the building, which houses the arts centre, comprises a prefabricated structural frame in cross-laminated timber and glulam. Here, a specially developed system of wood and steel supports has enabled the creation of a flexible and open space for many different activities and functions.

Early on in the project, the decision was taken to build 13 of the 20 storeys in the hotel section using prefabricated room modules in wood, stacked on top of each other between two lift shafts in CLT. The insulated glazing on the outer wall of the modules is also fitted in the factory. After assembly, the building's façade has been furnished with a transparent outer layer of glazing for full weather protection. When the sun is beating down, the heat is trapped between the glazed surfaces and can then be ventilated away.

»Prefab does have its limitations, but it can also help with setting parameters that mean we can actually afford to complete projects. The architecture is built around the idea that it should be easy to understand the building. We highlight its industrial nature and the fact that everything is built in a factory. Stacking the hotel modules on top of each other is part of the overall architectural expression,« says Robert Schmitz.

Fire safety has been high on the agenda during construction of Sara Kulturhus. In addition to a custom sprinkler system, all the exposed wood has been fireproofed and the insides of the lift shafts have been clad in plasterboard. The structural frame in the high-rise hotel section is designed to meet fire safety class R90 and the lower arts centre section

Architect **Robert Schmitz**

» WE QUICKLY SAW THE POTENTIAL TO DESIGN A TALL BUILDING IN WOOD. «

class R60, where R stands for load-bearing capacity and the number states the time in minutes that the structure will maintain its load-bearing function in a fire.

TK Botnia, based in Burträsk not far from Skellefteå, designs advanced structures in glulam and CLT, and is just one of the local businesses involved in the project. They planned the wooden structural frames for Sara Kulturhus and are responsible for all the structural calculations, including the necessary fixings and metalwork. TK Botnia also did the 3D modelling of the carcass, including production drawings for all the constituent parts of the building, plus assembly instructions.

»This is a complex building, not least because it uses two different structural systems that need to be connected to each other. The main challenge for us has been the high-rise hotel section. We've had to put a great deal of effort into reducing oscillations, creating stability and channelling the loads down to the ground. One major advantage has been our proximity to Martinsons, who produced the glulam and CLT,« says Kristoffer Malm, chief structural engineer at TK Botnia.

Norwegian firm Hent, the turnkey contractor for the construction of Sara Kulturhus, began planning and costing the project after an open tender in March 2018. Hent has spent many years building up its expertise in wood construction, completing several large-scale projects with a wooden carcass in recent years. March 2019 saw the completion of Mjøstornet in the Norwegian town of Brumunddal. This wooden tower is 18 storeys high and measures around 84 metres, making it currently the tallest wooden building in the world. Although the two projects are very different in terms of construction techniques, Hent's ability to draw on so much knowledge from Mjøstornet was a significant factor in securing the contract to build Sara Kulturhus.

»It's one thing to design a building and quite another to build it. So you have to attack problems, particularly at the planning stage, in order to come up with viable solutions. The key feature of this project is that we have worked in collaboration with others and with respect for all the different disciplines. Having the people involved on site during construction has shortened the processes and created excellent team spirit,« says Vegard Brå, project manager at Hent.

Building in wood is also closely aligned with Hent's focus on sustainability and reducing the climate footprint of construction projects.

»Here at Hent, we have long placed a strong emphasis on sustainability and our sustainability programme involves working on several of the UN Sustainable Development Goals, alongside our long-term ambition of becoming entirely climate-neutral. And wood is crucial to this,« continues Vegard Brå. »



Locally based prefabrication ensured short processes during construction. The architects wanted to make it easy to understand how the building is constructed.





Sara Kulturhus offers auditoriums of various sizes. The largest has 1200 seats over three levels.

» In many ways, sustainability is also the common denominator when it comes to Skellefteå's development. The idea is that the city will serve as a national pioneer when it comes to the green transition and sustainable urban development. But sustainable building is not just about the climate. The human perspective is just as important, and Sara Kulturhus provides an opportunity for both people and arts providers to meet across borders.

»This is a public building that is designed to be open and accessible. The arts centre is also a kind of workshop hosting a mass of creative processes that culminate in exhibitions, performances and concerts. It is a meeting place, but also a workplace that is equally enjoyable on stage and behind the scenes. From the outside, it's important to be able to see that things are going on inside,« says Oskar Norelius.

However, perhaps the most important sustainability aspect has been the partnership with the local wood industry. Since the Sara Kulturhus project has been run on a partnering basis, this has been an express focus, chiming well with Hent's own vision.

Martinsons in Bygdsiljum, 60 km outside Skellefteå, supplied the structural frame for Sara Kulturhus, comprising glulam posts and beams, combined with CLT walls, floors and ceilings. The project has been by far Martinsons' largest, with 10,000 cubic metres of CLT and 2,500 cubic metres of glulam installed over the course of the build.

»This was not a project that we took on lightly. The decision came after many internal discussions and was escalated all the way up to board level. How prepared were we, what were the risks and what did we have to gain from joining the project? We concluded that we have the expertise and that production at our new CLT factory was running well. Every completed project has brought new experience, so that we now have exactly the leadership needed for complex

Sara kulturhus SKELLEFTEÅ, SWEDEN

ARCHITECT White.
CLIENT Skellefteå kommun.
STRUCTURAL ENGINEERS Florian Kosche
(competition entry), TK Botnia.
AREA Approx. 30,000 sqm.
www.white.se, sarakulturhus.se

projects. The arts centre has added a huge amount to that bank of experience,« says Jesper Åkerlund, CEO of Martinsons Byggsystem.

As part of the contract, Martinsons also delivered CLT to wood industry company Derome's housebuilding factory in Renholmen outside Skellefteå. They assembled the modules for the hotel rooms, which Martinsons then installed on the construction site. This has proven a rewarding partnership between two local firms that Jesper Åkerlund would like to see more of.

»Taking on a large project like this one requires a few different kinds of solutions. And so, as wood-based builders, we need to be more open to finding new forms of collaboration. With Sara Kulturhus, we've shown that, all the way from production via design and planning to erection, it is just as possible to build huge projects in wood as it is in steel and concrete. I am very proud to have been on this journey with everyone.«

In an upcoming issue, Träl will be taking a closer look at Sara Kulturhus and a deep dive into both the architecture and the structure, as well as meeting visitors and the operators that have moved into the building.



Varför missa något förbättrat för att det är annorlunda?

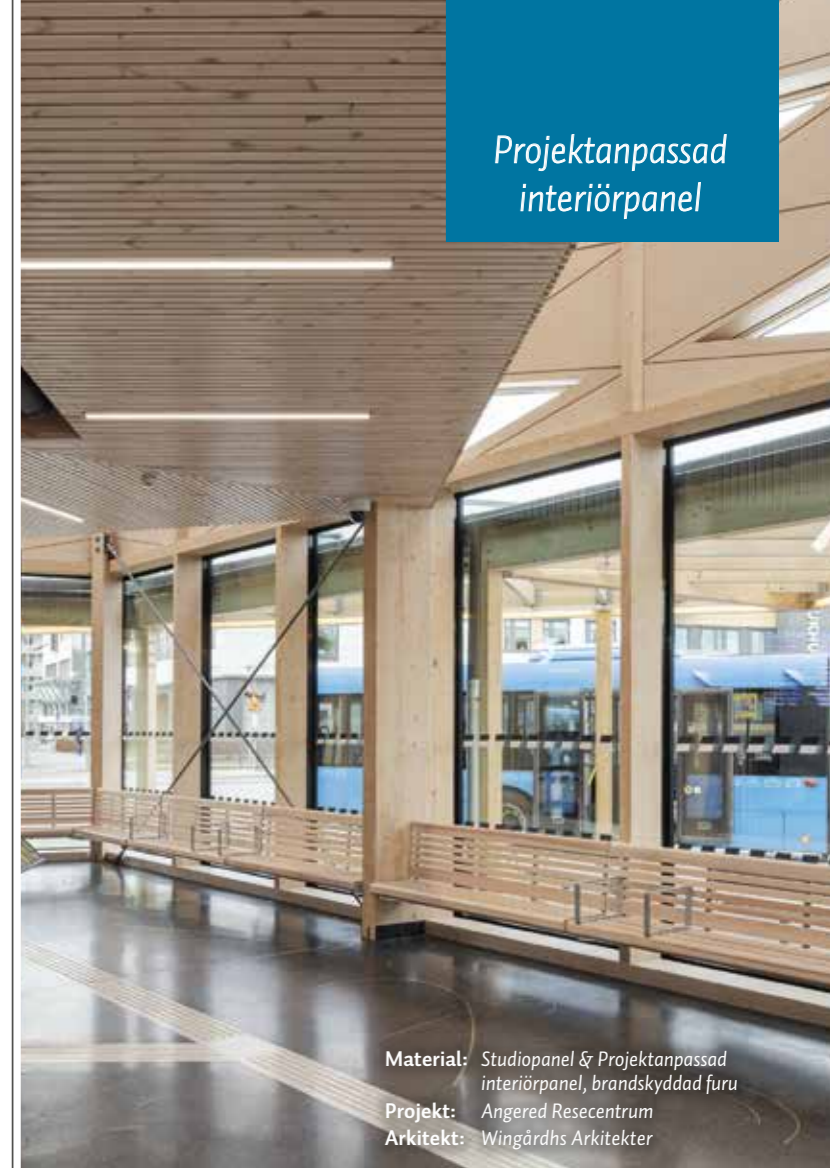
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Projektanpassad interiörpanel

Material: Studiopanel & Projektanpassad interiörpanel, brandskyddad furu
Projekt: Angered Resecentrum
Arkitekt: Wingårdhs Arkitekter



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TEMPORARY EXHIBITION HALL PROVIDES GRANDIOSE VOLUME WITH ELEGANT MODULAR ARCHES IN THE HEART OF PARIS

TEXT Ellinor Thunberg PHOTO Patrick Tourneboeuf

When Wilmotte & Associés Architectes were commissioned to design a temporary, modular exhibition hall and event arena as a short-term replacement for the illustrious Grand Palais, they chose wood. The selected elements were prefabricated for a post-free structure that can even be reused.

The monumental Grand Palais on the Champs-Élysées hosts around 40 events for as many as two million visitors in a normal year. But the historic exhibition hall is 121 years old and was in need of major renovations. So Réunion des musées nationaux – Grand Palais joined forces with the Olympic organisation Paris 2024 to create a temporary building – in at least as prominent a location in central Paris – where events could be held in the meantime. The refurbishment work is scheduled for completion in time to host some of the events at the 2024 Paris Olympics. Before then fashion shows, culture, sport and exhibitions will be held in the temporary venue that goes by the name of the Grand Palais Éphémère. But where the original from 1900 uses huge amounts of stone and steel, the temporary replacement has a cruciform double-arched structure in wood. The Champs de Mars park was chosen in part because of its history, as the location

of the 1867 International Exposition. The new building has certain similarities with the original – for example in its use of glass and its vaulted form – but in a more contemporary guise.

»The first step for us was to consider the shape of the plot, which looked like a cross, and to see how we could fill that whole space. The second issue we faced was how to build something that can be taken down after four years, so we decided to use wooden elements. Using wood is much simpler, and above all it meant we could erect the same building in a different location after four years if we avoided concrete,« says architect Jean-Michel Wilmotte, founder of Wilmotte & Associés Architectes.

The cross measures 145 x 140 metres, with the Eiffel Tower and the École Militaire at each end of the longer axis. The transverse section is 51 metres wide and the longitudinal section is 33 metres wide. The height has been adapted so that the military school can still rise up and take its place in the cityscape above the newcomer. The arched form came out of a desire to build 10,000 square metres without any internal posts. Each arch comprises two differently shaped and curved »

The temporary exhibition hall is located in the park next to the Eiffel Tower and is built around arched glulam trusses to allow for easy disassembly.

» glulam beams joined by a network of timbers. This forms a double geometry with a simple interior arch and a more complex curved form on the exterior. Noggings are then placed between each arch. The geometry of the large central cross is more complex, bringing together all the sections and creating a high cruciform centrepiece. The arches are raised on tall steel frames cast into concrete plinths.

The total of 44 arches were prefabricated in eastern France and then transported, assembled and erected one by one. A new arch was put up almost every day for three months. Building in wood using prefabricated elements makes it perfectly possible to dismantle and reconstruct the building elsewhere, in full or in part. But the material was also chosen because it is renewable and, in this

Project manager **Julien Davayat**

» **ONE OF THE BIGGEST CHALLENGES WAS THE LIMITED SPACE FOR STORAGE AND LOGISTICS.** «

case, PEFC-certified from sustainable forestry. In addition, both Jean-Michel Wilmotte as project manager and Julien Davayat of GL Events also pick out a number of other benefits that choosing wood brought to the actual construction process.

»Working with wood gave us a cleaner construction site, with less dust, but also less noise compared with a structure that involves cutting and hammering steel components. Using prefabricated elements also enabled our factory to work night shifts,

which would not have been possible on site due to the residential nature of the area,« comments Julien Davayat.

A smoothly running construction site works perfectly well in the seventh arrondissement in the heart of Paris, but building among historical buildings, tourist attractions and residences brings other challenges.

»One of the biggest challenges was the limited space for storage and logistics. All the prefabricated elements had to be delivered to the right place at the right time, which required future needs to be accurately predicted and coordinated with the factory.«

Juliette Armand, Events Manager at Grand Palais Éphémère, reports entirely positive feedback since the building opened at the start of the summer. Over the few months that they have been open, they have held events for diplomats, a cultural event and an industry event for the fashion world.

»Both the public and the industry are impressed by the building's elegance, its volume, proportions and purity of design, but also how it has been integrated into the green setting of Champ de Mars and the exceptional view of the Eiffel Tower,« she says.

The double arches essentially form an outer and an inner shell, which has proven good for acoustics, ventilation and heating, with lower energy use as a result. The transparent material that covers the outside of the arches is a polymer fabric made from minerals instead of oil, which requires 90 percent less energy than the production of glass. What is more, it can be fully recycled. Lighting among the network of wooden supports makes the arches visible through the fabric. The inside has been insulated and clad with acoustic panels painted a dark grey.

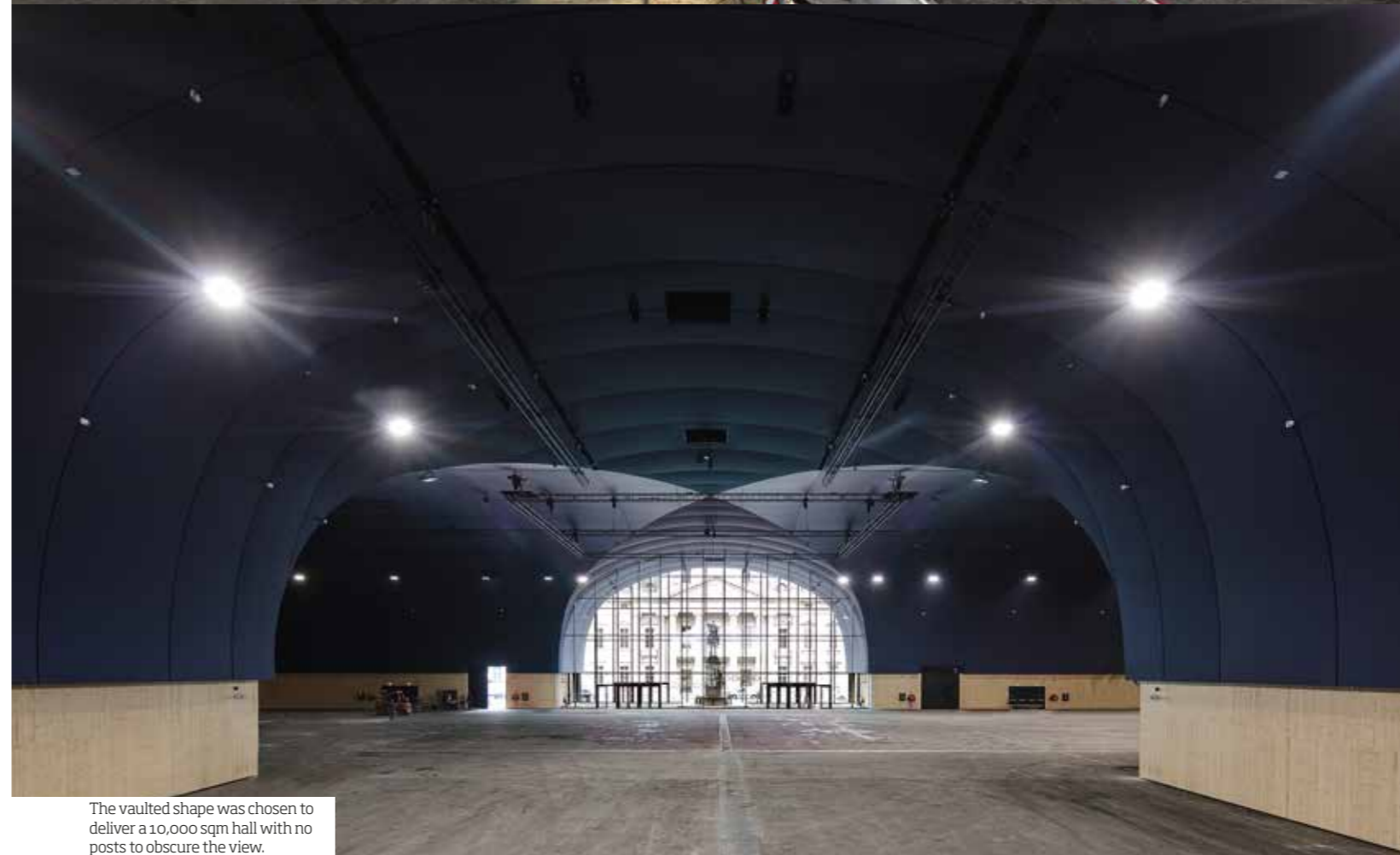
»The building has to be absolutely safe, the acoustics need to be perfect... Everything »



Each arch comprises two differently shaped glulam beams, trussed together and mounted on steel frames cast in concrete.



The nave, where the four arms meet, has a more advanced geometry that requires arches of thicker dimensions.



The vaulted shape was chosen to deliver a 10,000 sqm hall with no posts to obscure the view.

Timber framing for all scales and all times

The US entry for the Venice Architecture Biennale puts timber framing front and centre. In a move to promote and present the most common construction technique in the USA, and to raise the status of timber framing, a four-storey timber-framed entrance pavilion has been added to the American neo-classical pavilion from 1930.

TEXT Stina Hagelqvist

The pavilion and exhibition have been produced by Paul Anderson and Paul Preissner, architects and lecturers at the University of Illinois School of Architecture, who also worked with their students to investigate American timber-framed architecture via a number of historical buildings that are displayed in model form in the exhibition.

In Sweden we can find a handful of historical variations on the timber-framing concept. Half-timbered, post-and-plank, stave construction, palisade and post construction are all terms referring to ancient and regional building techniques and principles that employed locally available timber. What they all have in common is a structural frame in wood. The differences come in the form of wood types, dimensions, infill material and not least the aesthetic look. With the expansion of the sawmill and wood products industry in the second half of the 19th century came the advent of timber frames using slimmer and eventually standardised construction timber that could be sold by mail order and easily dispatched by rail to the nearest station for collection. As the American submission for the Venice Biennale seeks to explain, timber-framed housing accounts for 90 percent of total US homebuilding today. The entrance pavilion demonstrates how timber framing is just as capable of accommodating monumental designs. The aim is to showcase this more anonymous form of construction and to explore the possibilities and aesthetic potential of timber framing. However, the question here is not whether the American entrance pavilion has achieved its ambition, but what opportunities timber framing offers for the future.

The rate of expansion, the variation and the scope of the American timber-framed architecture presented at the exhibition shows how the method of stick building in timber can meet the requirements of a society in rapid development. The timber-framed structures follow the pioneers as they head west during the colonisation of North America, adopting as many forms as are needed along the way. The students' models show timber-framed structures spanning considerable ranges of age, scale and function – from



Courtesy the Pavilion of the United States at the 17th International Architecture Exhibition at La Biennale di Venezia.



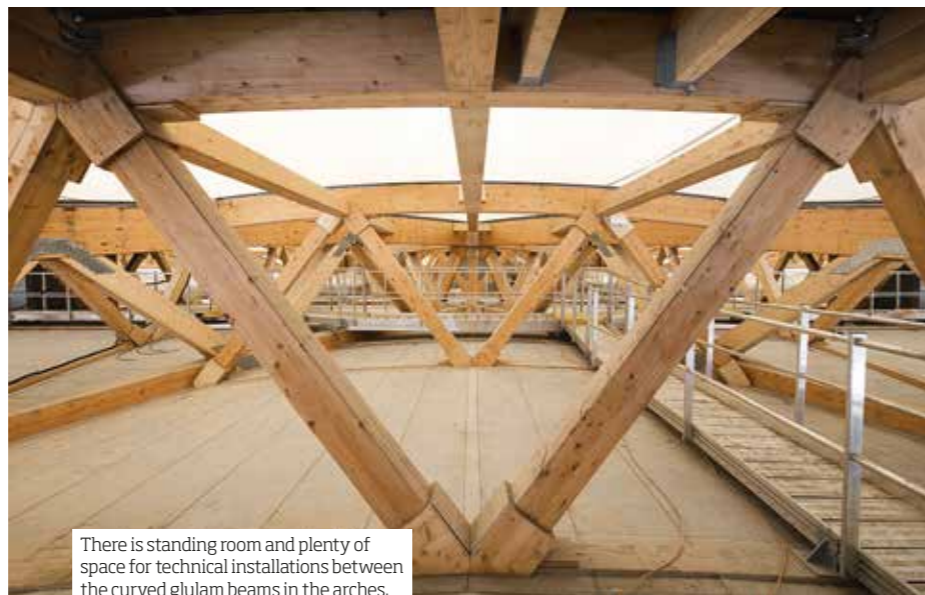
Chris Strong



The ends of the cross-piece house offices, meetings rooms and storerooms, as well as the necessary facilities for visitors.

Grand Palais Éphémère PARIS, FRANCE

ARCHITECT Wilmotte & Associés Architectes.
CLIENT Réunion des musées nationaux Grand Palais in partnership with Paris 2024.
PROJECT MANAGEMENT & STRUCTURAL ENGINEER GL events.
BUDGET EUR 40 million to cover design, construction and technology/maintenance for four years plus dismantling.
AREA 10,000 sqm.
w| wilmotte.com



There is standing room and plenty of space for technical installations between the curved glulam beams in the arches.

» has to be perfect! But it also has to have a little elegance, standing as it does between the Eiffel Tower and the military school. This is an important part of Paris. We're not on the outskirts of the city, we're fully at its heart,« says Jean-Michel Wilmotte.

The positioning has been carefully considered to harmonise with the setting. The surrounding architecture is also reflected in the glazed gable ends, while the statue of the French general Marshal Joseph Joffre, which already stood on the site, has been incorporated into the entrance.

»It's really quite big, almost 15 metres tall!

We couldn't move it, so we made it part of the entrance – it's great because it looks like we specifically designed a display area for this work between the double glass walls. I love that.«

The modular system means that the building can be added to and changed as required.

»Everything was prepared in the factory, and when the arches arrived, we raised them up to vertical on the ground and then secured them to the preceding sections. It was an incredibly simple system, and we could have made an even longer building.«

The idea is that the building will be

dismantled after the 2024 Olympics, by which time the refurbishment of the Grand Palais should also be complete. The disassembly is expected to take six months, and the cost has been factored into the budget. There is already considerable interest in having the modules erected in full or in part elsewhere, according to the architect. This is perhaps not surprising considering how easily it can be done and how natural it feels. However, we shouldn't forget that the neighbouring Eiffel Tower was meant to be a temporary structure, and that is still standing over 130 years later.Ⓞ

» I'D LIKE A FOCUS ON THE SUBSTANCES THAT MAY BE RELEASED INDOORS. «

The financial crisis of the early 1990s caused many young architects to seek a different path. For Maria Block, it instead became an opportunity to dive deeper into what was most important to her – green building. Since then, she has focused on building sustainably, and here are a few of her top tips.

TEXT & PHOTO David Valldeby

How did you get into sustainable and green building?

I've always been interested in what goes on behind the façade, what we build into things and what consequences that has. During the financial crisis, I went to a conference called Eco Logical Architecture, where I met Varis Bokalders, and it turned out that we were both thinking about writing a handbook for green building. I applied for funding for the project, and the first edition of *Byggekologi – kunskaper för ett hållbart byggande* (Construction ecology – knowledge for sustainable building) was published in 1997. There have now been three issues so far.

You're working on the latest edition. What's new?

New things are happening all the time in areas like recycling, chemicals, new materials, ecocycles, energy and so on. Greenhouse gas emissions and climate adaptation are going to be vital for our future. Progress has to be steered in the right direction during the 2020s.

How can we achieve a healthy and sustainable building?

Material and product choices are important, but so are technology and installations. There are several environmental certification systems to follow, but we can go further. Collaborating with clients and contractors so everyone fully understands the choices and the overall ambition. And follow-up by the architect during construction.

Have many new materials come onto the market?

Yes, and I look forward to more financially viable bio-based materials. However, products can also change over time. For a long while, I prescribed a linseed oil product based entirely on renewable raw materials. After a few years, I called to speak to the supplier and found out they had switched to fossil material. We all need to keep ourselves up to date.

What are the important points to bear in mind?

Mechanical connections are good, from both a chemical and a recycling perspective – using screws, nails or dowels. There is too little discussion about chemicals – in adhesives, sealants, grouting, silicones, paints and surface treatments, epoxy resins, levelling compounds and expanding foam – basically everything that might be used to build wooden structures. Make informed choices, think about the work environment, the indoor environment and nature in general.

I'm not concerned about using glulam and CLT made using small quantities of glue with acceptable emission values, but think about all the other panels that are used: OSB, particleboard and MDF. I usually check that the glue content is as low

as possible. It can vary quite a lot between manufacturers. Wood-based adhesive made from lignin is also under development.

I'd like to see more of a focus on the substances that may be released from products in the indoor environment. Germany, Belgium and France have tougher requirements than Sweden and measure more substances, whereas the only emissions measured in Sweden are of formaldehyde.

What materials would you say have the greatest impact?

The surfaces that are exposed in the indoor environment are particularly important, but furnishings and electronics also make a difference. We've lived with wood for centuries and know that it works – pure wood products are good. I use fossil free products such as paints wherever I can. Waterproofing systems, for example in wet rooms, are extra difficult, and I've chosen to work with a panelling system of plywood with a pre-finished surface, where a small amount of glue is the worst component.

I like lightweight construction systems because they really reduce greenhouse gas emissions. There was an interesting report from IVL Swedish Environmental Research Institute that compares different construction systems for a six-storey building where the parameters are exactly the same except for the structural frame. This clearly shows that wood construction is better from a climate perspective.

What about the foundations?

I try to avoid expanded foam and concrete. There is quite a lot of promising research into wooden foundations. I usually use foam glass gravel and sheets or perlite. It's a long-lasting material that doesn't attract pests and avoids damp problems.

You've worked quite a lot with aspen. Tell us more!

Hardwood is underused in Sweden. Russia, Finland and Norway all use aspen both internally and externally, and it's our second most common deciduous tree after birch. Regionally produced aspen chips were used in Piteå – a small sawmill in Glommerstråsk bought a plane in order to produce larger quantities.

Do you need to work locally to build ecologically?

Being able to work locally or regionally is fantastic, but generally speaking transport and distribution don't amount to very much in a life cycle assessment. The biggest impact on the environment comes from the construction materials and operation of the building.

What can we do during the operational phase?

75 percent of newly built apartment blocks do not live up to their energy efficiency projections. Make sure that buildings are calibrated properly with regard to control and regulation. Make buildings properly airtight and preferably breathable, using renewable insulation materials. I like to work with termite ventilation. It's quiet and it requires little energy. I take a low-tech approach where possible, going high-tech where necessary. Don't build unnecessarily large. The best kind of energy is the energy that never needs to be used. ☺

Read more about building sustainably

IVL's report on the climate gas emissions of common construction systems in Sweden
[w| ivl.se](http://ivl.se)

Info about new materials
[w| materialdistrict.com](http://materialdistrict.com)

List of chemicals to avoid (alongside the EU's REACH regulation)
[w| sinlist.chemsec.org](http://sinlist.chemsec.org)

The foundation Byggekologi
[w| byggekologi.com](http://byggekologi.com)

Light and space in multiple zones

The historical parstuga inspired Martina Eriksson's design for Villa Lake/Streich. Temperature zones and rooms that can expand outside save energy and add extra interest.

TEXT Catrin Hellmark PHOTO Emma Jönsson Dysell



Interior

Salthamn, on the rocky west coast of Gotland, is the location of Martina Eriksson's modern take on a classic Swedish parstuga, currently home to Lisa Streich, Joe Lake and their three children. Two volumes of different heights are connected by a third volume that forms a middle zone.

»I've taken this design from the old countryside parstuga. It appears across Dalarna, where I'm from, as well as in Skåne, Hälsingland and on Gotland, and is based around two volumes, with one or two storeys,« explains Martina Eriksson.

In these »cottages of two halves«, you usually enter into an enclosed central hall that makes sure heat never escapes out into the cold winter air.

»So in this case, I've placed a middle zone between the two sides. And in a parstuga, you tended to only heat one side of the house, with the room on the other side heated as required, like for parties or weddings,« says Martina.

Villa Lake/Streich reflects this idea, with one part just for occasional use. The lower cube has a guest room downstairs and the parents' bedroom upstairs, while the taller cube houses a social space with living room

and kitchen. From there, stairs run up to the top floor, with the children's bedrooms and a play area. A large bathroom sitting above the central section provides access to the master bedroom.

»Both Lisa and Joe's parents live abroad, so they often come over for quite long stays, but there are also big gaps in between stays. So the guest room can be mothballed, and then I've put Joe and Lisa's bedroom on the top floor. Here the temperature can be turned down for a cool night's sleep. In the other building, the temperature can be kept a little higher, helped by a fireplace just like in the old cottages.«

The house draws on ideas about how Swedish homes were built in the past, with each function having different temperature requirements. Not like now, when very large houses are built and everything is heated the same, according to Martina Eriksson. She prefers to design houses where sliding doors regulate how much of the space is used and heated.

In this case, the kitchen and living room are open-plan and double-height, reaching up to the roof. The kitchen, with its units and attractive open shelving in the gable window,

1. Villa Lake/Streich with its three distinct volumes. The owners wanted the feel of the forest and natural materials.
2. The thin steel mesh balustrade lining the stairs and loft is wonderfully transparent, forming a connection between the floors.
3. The pines provide a play of shadows through the bars of the large window, creating »frozen music« in the combined living room and kitchen.
4. The interior is dominated by pine, both oiled and untreated, including in the bathroom.

Villa Lake/Streich

SALTHAMN, GOTLAND

ARCHITECT Martina Eriksson.
CLIENTS Joe Lake & Lisa Streich.
STRUCTURAL ENGINEER Algeba Byggkonsulter, Peter Kristensson.
LIVING SPACE 135 sqm.
COST Buildings above ground, approx. SEK 25,000 per sqm.
w| m-arkitektur.se

is relatively small – but opposite the glass doors stands an outdoor kitchen. This is also part of the temperature-related design, as well as providing a social space for warmer days.

»The kitchen can be extended outwards, providing storage and somewhere for the recycling bins. Because surely not everything needs to be kept at 22 degrees? Building is expensive, so if some things can live elsewhere, like they used to in days gone by, in simpler buildings or spaces, that can bring the cost down.«

Martina Eriksson speaks warmly about the multi-building approach of old, where each building had its own function and temperature. She advocates thinking beyond large houses containing everything in one space, all heated to the same level, as they are expensive to build and to run. She also works with semi-climatized zones, such as earth cellars and orangeries, that use the ground's capacity for cooling or heating. This allows for the home to expand, and Villa Lake/Streich is already prepared for the addition of more buildings as the need arises. However, Martina is clear that temperature is not just about cost:

»I also see temperature variations as a

quality. Being able to feel, when you enter the different functions, that they are adapted not just in terms of appearance and materials but also temperature. And making the garden part of the living space, like when you go to the earth cellar and get that autumnal feeling... Everything you design should be architectural and create an experience. It adds to life.«

Villa Lake/Streich can thus be considered the first instalment ready to be added to: a base station made entirely of pine, oiled in places but mainly untreated. In the kids' section, the curtained box beds in the simple cabins of Dalarna prompted the idea of sleeping alcoves, which are like a private room within a room. This feeling is accentuated by the different ceiling heights, and Martina Eriksson has also taken great care to create intermediate zones.

»I like zones between the most private and the social spaces, where you can be present but still slightly removed. Somewhere to read, play or sit with your computer. So when the children emerge from their beds, they can do things on the landing and at the same time have contact with the kitchen

below and the social space with its sofa, piano and books. But there are also nooks to hide away in.«

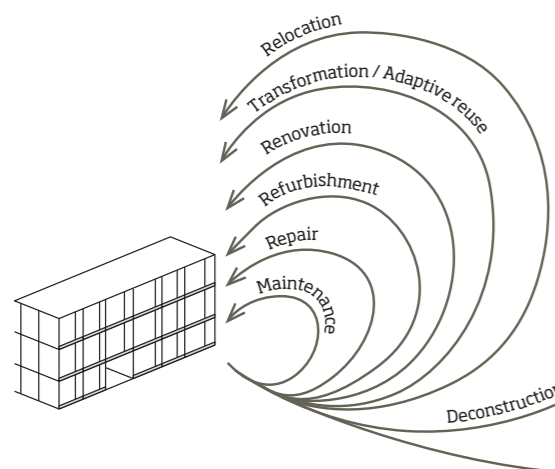
Whether alone or with others, everywhere offers magnificent views through the pines and on to the Baltic Sea, particularly the social space with its impressive windows.

»The aim was to emphasise the sense of living among the trees. Lisa and Joe moved here from Berlin, desperate for some trees, and the pines are good because they let light through. Plus they catch the wind,« says Martina Eriksson.

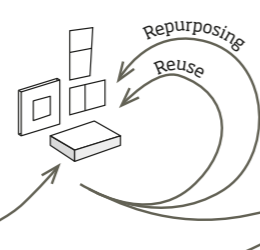
The windows also allow the play of shadows from the trees to become part of the interior. Lisa Streich, a composer, and Martina Eriksson designed the windows together.

»Lisa helped to create the window arrangement, with the shadows and the window bars forming a kind of musicality. The idea comes from La Tourette, a convent designed by Corbusier. The windows were made by the musician and mathematician Xenakis, and I was really struck by the way he took a particular musical system and 'composed' a work comprising shadows, window bars and light. It was like a piece of 'frozen music', and that's what I went for here, too.«

1. Building preservation



2. Component preservation



3. Material preservation

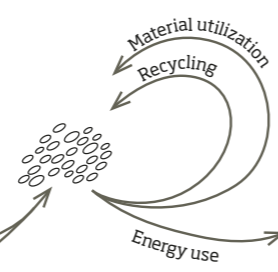


Figure 1. Researchers Satu Huuhka and Inge Vestergaard have adapted the circular model to the context of a building.

Circular building over time

The most circular buildings are the ones that are kept viable and used over several generations. Building preservation is crucial in this, with older buildings adapted to today's needs so they can continue to fulfil a function.

TEXT Tobias Jansson PHOTO Christoffer Skogsmo

Looking back at the history of construction, it soon becomes clear how well it chimes with the circular economy. Buildings have been able to remain standing for centuries and, in a way, be circulated between generations, in part because of high-quality materials and craftsmanship. They have also survived the tastes of many generations and aged gracefully.

The materials and structural solutions of older buildings make them almost designed for preservation, through simple maintenance and the ability to replace damaged elements. The building materials are largely natural – solid wood, bricks, lime, flax

insulation, linseed oil paint – which means that if such a building were to fall into disrepair and, perhaps hypothetically, be reclaimed by nature, much of it would be broken down, and the remains would pose no threat to the ecosystem. Finally, the construction techniques are often based on reversible solutions, where the buildings could be taken apart, and then re-assembled somewhere else, like with old log-built structures, and indeed tiled roofs.

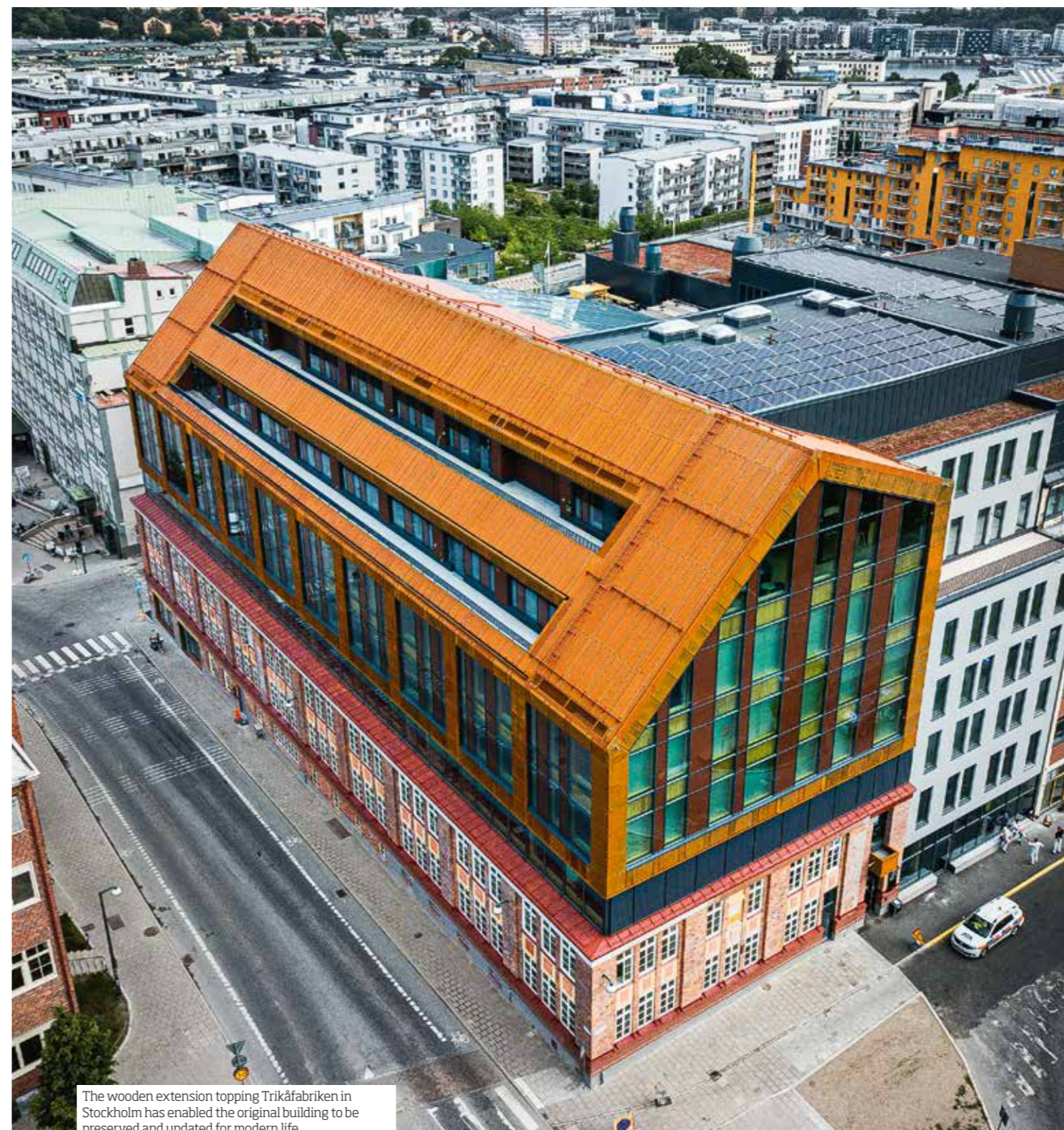
There is a natural logic to the idea that the buildings that last over time – that people like and look after so they can be circulated between the generations – are also the best for the environment. The greenest buildings are those that have already been built and are allowed to remain standing. Research has shown that it can take as long as 80 years to compensate for the greenhouse gas emissions involved in demolishing and building something new instead of preserving and renovating. This is despite studies showing that the new buildings are more energy-efficient in terms of heating.

Buildings that are kept viable over time are represented by the innermost circles in the technosphere, in the model of the circular economy. Researchers Satu Huuhka and Inge Vestergaard have adapted the model to the context of a building (figure 1), illustrating in another way that the greenest – or most circular – buildings are those that are already

built and then maintained and preserved. Building preservation should be developed into a process that involves not just looking after really old buildings that are a century or centuries old, but also preserving and developing buildings that are much younger. Part of keeping a building going over time is about sympathetically reshaping it to make it functional for modern use. Instead of demolishing an entire building, it is possible, for instance, to reuse and redevelop an existing structure by adding upward extensions in order to meet the demand for new housing and offices. An article in *Träl* magazine (2/2020) showcases four current Swedish examples of just this, where buildings such as Trikäfabriken in Stockholm and Skellefteå Kraft's offices in Skellefteå have had a number of new storeys added using a wooden structural frame. As well as being more climate-friendly than concrete structures, wood is relatively light, bringing flexibility to urban densification and extending the service life of existing buildings.

Preserving buildings so they can last a long time is of course an attractive ideal, but it is also a necessity from a climate perspective. But what happens with all the demolition waste? Huge quantities of fully functional building materials are currently being disposed of on a rolling basis, perfectly illustrating the idiocy of the linear economy. Breaking a building down needs to shift from demolition to a greater degree of deconstructing buildings, with components assessed and taken off to be sold on a second-hand market.

This approach was presented in the *Waste-land* exhibition at the Vandalorum art gallery outside Värnamo in the summer of 2018. For the exhibition, the Danish architectural



The wooden extension topping Trikäfabriken in Stockholm has enabled the original building to be preserved and updated for modern life.

practice Lendager Group created a number of concept components using materials such as wood, concrete, brick and glass. These included sawn-out sections of brick wall from demolished properties that can be reused as ready-made blocks in a new structure, as well as rustically rough façade materials made from scrapped window frames and large sections of glazing put together from discarded windows of different sizes – all with a very modern feel. Is this the recycling of the future or even of today?

Imagine if we could create demountable

architecture where, once the building has come to the end of its useful life, the constituent building materials can be separated out and used again? Architecture that takes the reversible solutions of the past as its ideal. This is exactly what Danish architectural practice GxN has aimed for in Circle House, the world's first apartment block built with materials that can be recycled without any loss of value.

In this sense, Circle House perhaps represents a polar opposite to keeping buildings viable

for a long time. Looking to the future, I am convinced about the need for buildings that are a bit of both: Buildings that can last, that will never go out of fashion and are made to be preserved – while also being flexible enough, with reversible solutions where possible, to let us reshape the building as new needs arise. ☺

This text was originally written for the *Länslivat* exhibition produced by Crafts & Building Preservation (Region Västra Götaland), which is currently touring the county. Author Tobias Jansson also runs the blog CircularEconomy.se.



Parts can be replaced in log-built structures which can also be dismantled and erected elsewhere. Pictured is a log-built storehouse that is having its sill log replaced.



Modern oasis within older development

A new apartment block in wood has been squeezed into the middle of a Parisian concrete housing complex as part of a densification drive. This little oasis boasts a lush courtyard, secret little spaces and Japanese-inspired architecture. But many creative solutions were needed to get all the pieces in place.

TEXT Marit Engstedt PHOTO Charly Broyez

Coming home marks a transition from the public to the private sphere. A point where the necessary separation between the outside world and the intimate takes place. This is how French architectural practice Mars describes its Paris XII project in the heart of Paris.

From the buzzing city streets of the 12th arrondissement, you step through the entrance of an 11-storey concrete apartment block in the Brutalist style of the 1970s. Then

you move on into a courtyard where quiet and lush calm envelops all the senses. Groups of low-growing deciduous and conifer trees, ferns and ground-cover plants accompany you along the meandering stone path. And rising up at the end stands the new Japanese-style wooden building, clad in European Douglas fir, with vertical posts and inset balconies with sliding shutters. The winding path leads to an entrance beneath a canopy of projecting wooden beams, with the end-grain wood protected by a coat of white paint – a detail that also enhances the architecture.

The entrance is a passage to a completely white inner courtyard, contrasting starkly the green, tree-lined garden outside.

The courtyard is a communal space that leads to all of the apartments, via a footbridge and access balconies.

»This project serves up lots of hidden and secret spaces. As you pass the first layer of

1. The Japanese-style block is clad in European Douglas fir and has vertical posts supporting each storey. The inset balconies help to protect the façade and the shutters from the weather.
2. All the apartments lead off from the white inner courtyard via stairs and access balconies.

Paris XII
PARIS, FRANCE

ARCHITECT Mars Architectes.
CLIENT Gecina.
STRUCTURAL ENGINEER Scyna 4.
WOOD ENGINEER Sylva Conseil.
AREA 716 sqm.
www.mars-architectes.com

the existing building, you discover a whole new world. First come the garden of plants and trees and the winding stone path to the entrance. Then there's a second landscape in the internal courtyard, with its white walls optimising the light,« explains Julien Brousart, architect at Mars Architectes.

The main body of the building is narrow, and the 14 apartments run from front to back, overlooking the green garden on one side and the white inner courtyard on the other. On the garden side, the living rooms and bedrooms of the apartments each have access to balconies. The rooms communicate with each other through a double system of sliding doors, on each side of the fixed wall in the middle, which allows for a circular flow around the apartment.

The entrance hall, kitchen and bathroom all gain natural daylight from the white courtyard. The layout enables all the pipes, cables and other technology to be concentrated in a central shaft in the load-bearing

structure, into which storage and wardrobes are also incorporated. Just like the living room and the bedroom, all the rooms connect to each other through sliding doors. This accentuates the Asian inspiration, but also saves on space.

Raphaël Renard, architect at Mars Architectes, explains the drawings:

»We try to design apartments that face in two directions. We believe in the natural qualities that come from having natural ventilation and sunlight in all the rooms and an optimal flow. All the apartments also have balconies or terraces, which help not only with the look and with quality of life, but also with safety. We couldn't make a wooden building without giving a good deal of thought to safety.«

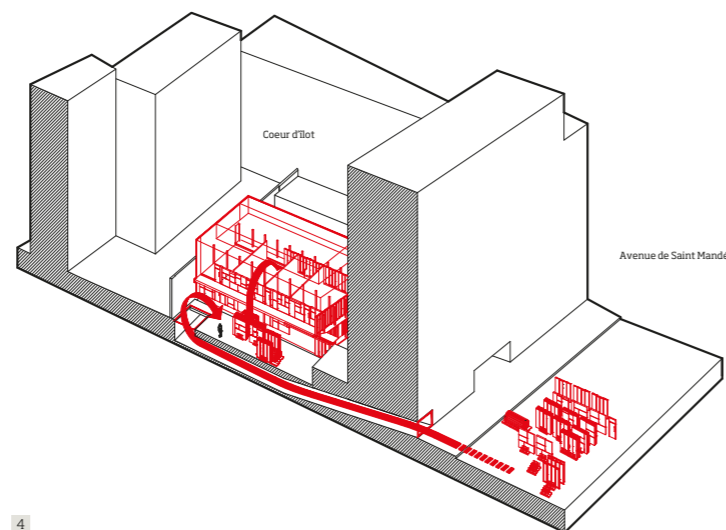
However, the most striking aspect of this new development is not the magnificent setting, the architecture or the carefully considered layout. The most fascinating question is how everything got here, considering that

the plot is surrounded by several high-rise apartment blocks.

In 2012, property company Gecina commissioned Mars Architectes to conduct a study of its entire portfolio in Paris. New city plans and regulations opened up opportunities for denser development of the city centre. This construction project came out of that study and was completed in October 2020.

The brief for the project was to design an exemplary building and grounds in line with modern expectations and aspects such as environment, construction and quality of life for the residents. It had to be a quality building in terms of natural light, architectural atmosphere and eco-aware materials. Another stipulation was low energy use, during both construction and occupancy.

Since the plot was surrounded by an apartment complex, a number of innovative ideas were needed. Conventional lifting equipment and access by air were ruled out. In addition, »



» it was vital that residents could still use the entrance to the existing building during the construction period. These constraints prompted all the materials to be routed through the underground car park. The garage connects the street outside with the inner courtyard, via the basement. However, space was tight, with maximum clearance of 3.5 metres across and 2.3 metres of headroom. In addition to access constraints, there were weight constraints, since the new structure sits on top of the existing car park. The solution was to build using prefabricated wooden elements that could be brought into the courtyard via the narrow passages of the garage. The car park's top slab was drilled through in the courtyard to access the prefab units, which could then be erected on site.

In addition to the inherent qualities of wood, such as storing carbon dioxide, there were other reasons for wanting prefabricated wooden modules, according to Mars Architects, including a more efficient design and a shorter construction time. The idea was also to create a project in wood that could be entirely dismantled when the time finally came.

To make the whole thing work, construction companies and suppliers were challenged to adapt to the ambitions and limitations of the project – they needed to be flexible and creative. This included using BIM to create 3D models during the design process in order to plan and visualise the project, facilitating custom prefabrication and structural optimisation of weights, plus dimensions and

3. The entrance, with its white-painted end-grain wood, points the way to the white inner courtyard.
4. Strategy for transport and installation of the modules.
5. Internally, white walls are combined with various woods for the floor, ceiling and window surrounds.
6. Squeezed into the middle of a Parisian concrete development from the 1970s, the wooden block results from a study into new opportunities for the city's densification.

equipment tailored to the site's constraints. According to Mars Architects, the project required an innovative approach that combined cutting-edge technology with true craftsmanship. The architects stress the importance of paying attention to design details such as connections, proportions and the use of different woods – to achieve a good structure that looks fantastic. ☺

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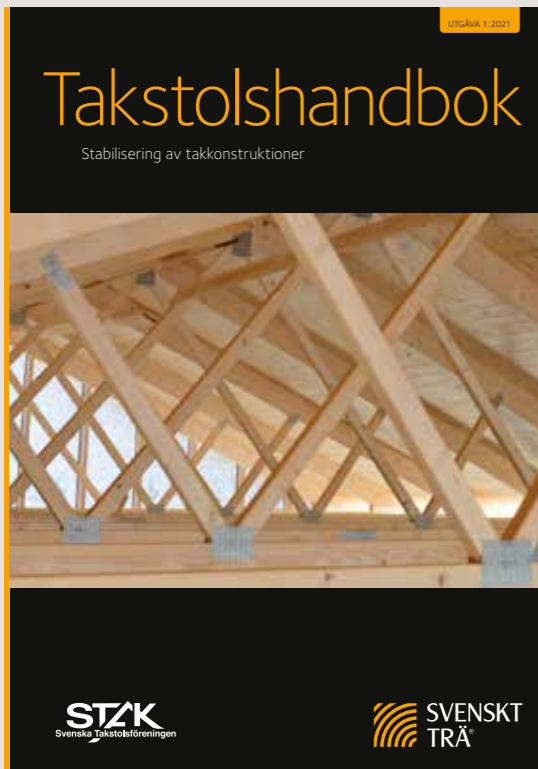
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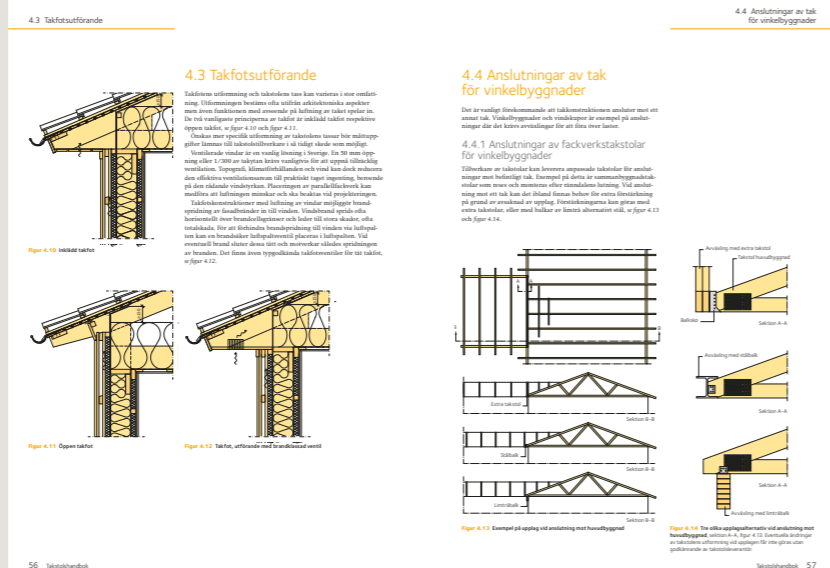
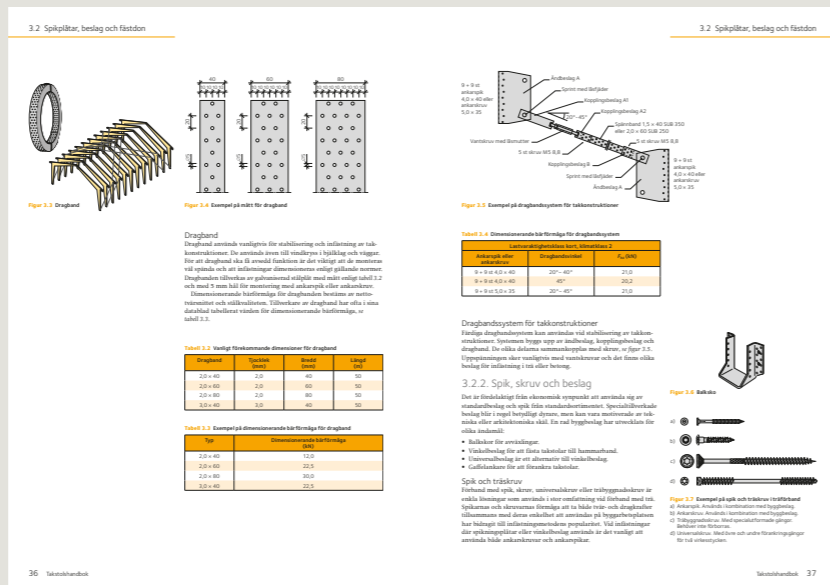
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The Roof Truss Handbook – stabilising roof structures
 Swedish Wood & Swedish Roof Truss Association (in Swedish)
 978-91-985212-0-7

The intention behind *Takstolshandbok* (The Roof Truss Handbook) is to help structural engineers and project planners to dimension and plan roof structures with wooden roof trusses. The book describes roof trusses in wood and the design of different wooden roof structures, as well as giving background and guidance on stabilising roof structures with roof trusses in wood.

It also highlights some of the many applications for which wooden roof trusses are currently used. The handbook is aimed primarily at structural engineers and project planners, but also at students, building contractors and other parties involved in the construction process. *Takstolshandbok* refers primarily to the European construction standards and Eurocodes that provide common dimensioning rules for



buildings and enable the verification of load-bearing capacity, stability and durability. National adaptations have been made to the Eurocodes, based on the member states' particular conditions with regard to geology, climate and culture. These national adaptations for

Sweden are set out in Boverket's regulations on the application of European design standards. Order a print copy of *Takstolshandbok* (Swedish only) or download it as a pdf. svensktrra.se/publikationer-start/publikationer/takstolshandbok

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Swedish Design Movement **PARIS, FRANCE**
 Around 30 Swedish companies from the design industry will be attending the Swedish Institute in Paris to showcase the Swedish Design Movement and the power of Swedish design companies to drive change. Swedish Wood and Architects Sweden have jointly commissioned »Le Pavillon hexagonal« for the garden of the Swedish cultural centre. During this month of design activities, the Swedish pine pavilion will be a symbol of friendship and dialogue.
w|paris.si.se



Woodlife Sweden **SKELLEFTÅ, SWEDEN**
 Sweden has a long tradition of using nature's raw materials in community development. Woodlife Sweden places the user of the built environment front and centre. Visitors are taken on a journey through Sweden with its wide variety of climates and conditions – from city to countryside, and from small-scale to transformational urban projects. With the newly opened Sara Kulturhus currently hosting, the obvious links make the exhibition even more enticing.
w|sarakulturhus.se



4 December 2021 | Trä! issue 4
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