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WOOD CULTURE 21

CONSTRUCTION EXPERTISE FOR ARCHITECTS, DESIGNERS AND BUILDING OWNERS

ISSUE 09 | 2021

EDITORIAL

21ST CENTURY CONSTRUCTION MATERIAL

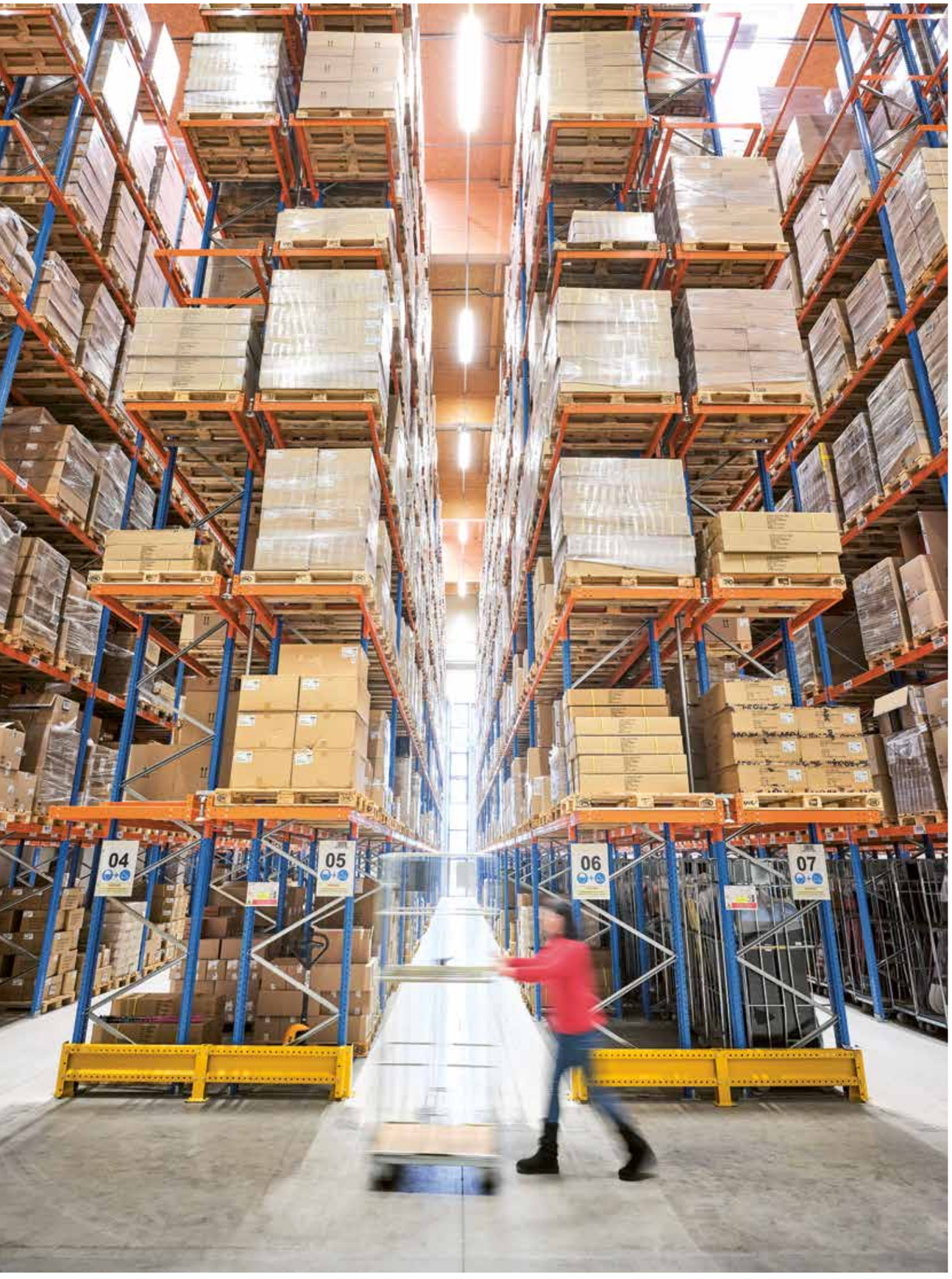
For some years now, multi-storey timber engineering has been experiencing a very positive development. Pioneering and path-breaking innovations in the field of timber engineering provide new opportunities for architects to build larger and higher buildings.

This development is mainly observed in urban environments where timber buildings are presently being built with up to 20 storeys. One of the most recent examples is "Roots", which will be Germany's highest timber building. Commissioned by Garbe Immobilien-Projekte GmbH, the building - with a total height of 73 metres - will be literally rooted in the Hamburg HafenCity. On a total of 20 storeys, out of which 16 will be built as timber construction, this outstanding building will be occupied by appartments and office areas. The project's background is quite remarkable since it is a classic investment project in one of the most attractive areas of Hamburg. Being an experienced investor who has repeatedly been able to set trends, Garbe has realised the attractiveness of timber engineering in terms of sustainability and intrinsic value.

In addition to the fact that timber is a renewable resource and an excellent CO_2 reservoir, factory prefabrication and thus resulting short assembly periods are increasingly being valued as important assets in project implementation. So, I draw the personal conclusion that timber engineering has already become part of our mainstream society since it represents a sustainable and useful lifestyle, which, reasonably combined with other building materials, creates pleasant living and housing spaces for us. Timber – the 21st century construction material.

Yours truly,

Peter Rubner
President of the Rubner Group



ATOMIC

THE RIGHT CONNECTION

Since the 1920s, Rubner has been literally relying on wood as ecological building material and has developed from a small, family-run business to one of the leading providers in international timber construction. The ski manufacturing company Atomic has experienced a similar development. Founded in 1955, it has developed from an individual company to the worldwide market leader for alpine skis. Two companies sharing the passion for one and the same material – timber – and also linked by the new logistics centre in Pongau, located in the Austrian State of Salzburg.

Since ancient times timber has been used for working and building purposes, such as the stilt houses that were built at the Lake Constance 5,500 years ago. Today, residential buildings in urban environments rise ever higher into the sky. Similar to ancient timber buildings, human transportation on timber skis is much older than many of us may think. The oldest skis found in Sweden were analysed by radiocarbon method and have been dated back to 2500 before Christ. Even if Scandinavian nations have started using skis as transportation means at a very early time, it was an Austrian citizen - Mathias Zdarsky (1856-1940) - who invented the alpine skiing technique. The wheelwrights' craftsmen group – originally in charge of construction and repair of wooden carriage and slide wheels - very quickly specialised to manufacture long wooden battens, before industrial ski manufacturing started in the 1940s.

In the Austrian market town of Großarl, located within the St. Johann Pongau district, a young mountain farmer was about to finish his craftsman training as a wheelwright. In 1955, the then 23 years old Alois Rohrmoser founded the company Atomic. One constant parameter that has been maintained over the years is the material that is still being used in today's skis. Timber provides solidity and stability. Not only one wood type but many of them – beech tree, ash tree, poplar and Caruba – are combined in the most various manners. Timber is used in connection with used in connection with modern materials such as carbon, glass-fibre mats, Titanal. Polyamide is used for coating and surface and steel is used for ski edges. There are manifold options, but it always depends on know-how, composition, and processing – both at Atomic and Rubner Holzbau.

Today, the small town of Altenmarkt not only is the "birthplace" of Atomic skis but also of many other highly renowned ski brands, such as Salomon, Armada and Volant. Due to its central location with regard to main markets in the Alpine area, the municipality of Pongau has ever since been an important logistics hub for the Finnish Amer Sports Group. To consolidate this position, massive investments have been recently made to install modern and digital production facilities and to secure extensive enlargements of the logistics centre. The Group's headquarters has thus been considerably upgraded and revalued. Atomic is therefore not a brand "Made in China" (although Amer Sports belongs to a Group that is managed under the leadership of the Chinese sports equipment giant Anta Sports) but still maintains its position as Austrian-rooted company offering products "Made in Austria".

"Made in Austria" is also a feature that characterises the new Atomic logistics centre. Structural engineering, execution design, production, delivery, and assembly - all provided from one single source, Rubner Holzbau based in Ober-Grafendorf in collaboration with the general contractor Granit from Graz. Some of the existing buildings had already been built as timber structures and Atomic wanted to keep this type of construction, which - besides ecological benefits offers many other technical advantages. These benefits can be explained by the properties of the material, its processability, its visual appearance, and its haptic qualities. Wood is the only renewable resource, energy input during production and processing is considerably lower than in the case of steel or concrete - with comparable performance rates but much lower tare weight. This allows to build large-span structures while eliminating thermal bridge effects. Glued laminated timber beams with

Completion: 2020
Building owner: Atomic Austria, Altenmarkt (AT)
Client: Bauunternehmung Granit, Graz (AT)
General contractor: Bauunternehmung Granit, Graz (AT)
Architect: Dr. Shebl & Partner, Linz (AT)
Roof surface: 7,000 m²
Glued laminated timber: 262 m³ in spruce
Photography: Michael Liebert

lengths of up to 50 metres are made from one piece. The 33 glulam beams with a weight of up to 10 tons for the supporting frame of the hall roof have been designed in lengths of up to 30.5 metres and bear the load of the factory prefabricated roof elements for the entire roof surface of 7,000 m².

In addition, the used glued laminated timber offers good resistance properties in aggressive environments and scores in fulfilling unexpected requirements. The material offers high natural fire resistance. The charred layer that is formed during the burning process at the material outside decelerates or even prevents a more profound burning process of the beam so that timber structures will never spontaneously collapse. Burning rates and thus load-bearing capacity times are calculable parameters. Finally, the fact that construction site was classified as seismic zone 1 also played an important role to opt for timber as construction material. The horizontal load that is applied to the building mass in case of an earthquake is an important parameter to dimension the structural frame of the building. Therefore, the much lower tare weight of timber constructions compared to massive structures is of great benefit.

MULTI-STOREY TIMBER CONSTRUCTIONS

ARCHITECTURE IS TAKING URBAN ROOTS

With continuous migration towards urban environments, timber engineering has found its place in our societies. Increasing demand for additional housing will best be met by using the natural construction material timber. This holds true in terms of constructional and design requirements but also in terms of ecological responsibility vis-à-vis our future generations. The most recent examples of timber construction implemented in Hamburg and Paris show the wide range offered by structural timber engineering.

Roots in the Hamburg HafenCity
Total height: 73 metres
Usable storeys: 20, out of which 16 as timber construction
Material: timber and reinforced concrete
Total floor area: 21,300 m^2
Architects: Störmer Murphy and Partner
Building owner and project management: Garbe Immobilien-Projekte, German Wild Animal Foundation
Timber engineering: Rubner Holzbau Augsburg
Start of construction pit: Q4 2020
Start of timber engineering prefabrication works: Q4 2021
Start of timber construction assembly: Q1 2022
Conclusion of timber construction assembly: Q1 2023
Completion of overall project works: scheduled for Q3 2023
Visualizations: Garbe Immobilien-Projekte

It has long been proven that timber is a high-tech building material with optimum structural and climate-friendly properties. This is demonstrated by numerous implemented timber buildings - starting with detached, single-family houses up to multi-storey, modern high-rise buildings. Moreover, timber buildings are perfectly suitable in the infrastructure sector: industrial and commercial buildings, administrative and cultural facitilies, school buildings and kindergardens and even health centres - just to name a few of them.

For many, many years there was no reason at all to question the superiority of concrete and steel as building materials for the construction of multi-storey buildings and skyscrapers. During the last decade, however, evaluation criteria have become more complex. The requirements of an optimum building "usefulness, stability and aesthetics" - which have first been mentioned by the Roman architect Vitruv 2000 years ago - are facing huge global challenges today. Nowadays, architecture has to cope with numerous problems, such as climate change, population increase and worldwide shortage of housing space.

To overcome this shortage in housing space, building activities need to be increased to a level much higher than today. This increased construction volume cannot be achieved by using traditional building materials alone since these traditional building materials entail major and far-reaching environmental impacts, which would then lead to important greenhouse gas emission rates thus possibly causing the acceleration of climate change.

A recent survey of the University of Yale published in the Nature Sustainability Magazine underlines, once again, the positive climate impacts of timber engineering. According to this study, timber is able to substitute other building materials, which cause climate-damaging CO_2 emissions.

In addition, the survey highlights that CO_2 is being stored in timber on a long-term basis and this means that it is stored in timber buildings as well. The more timber is used for timber constructions or timber products and the longer these buildings and products are being used, the longer this storage effect can be maintained thus protecting our climate.

We do therefore only have one single building material which allows to implement residential buildings in the required size and reduces, at the same time, greenhouse gas emissions caused by construction activities: Timber. Combined with innovative technologies, computer-aided design and production processes, fast-paced developments in the field of solid timber materials have accelerated the emergence of new timber building approaches. Alpine timber industry is considered international leader within modern timber engineering sector. Rubner Holzbau counts among Europe's leading timber engineering companies and has already implemented numerous flagship projects all over the world. One of these flagship projects is the Mactan Cebu International Airport on the Phillipines, the airport with the first, fully timber-made roof construction in Asia and awarded in the category "Completed Buildings – Transport" at the World Architecture Festival. Another flagship project is the BSKYB in London, the highest multi-storey commercial building in Great Britain at the time - having obtained the Wood in Architecture Award. Not to forget the projects implemented in the Australian cities of Melbourne and Sydney – highly recognised projects that have been granted Australian Timber Design Awards. Timber engineering is therefore excelling itself and is taking roots, above all in urban environments. The two projects that are prensently being executed are "La Ferme du Rail" in Paris and "Roots" in one of the most trendy Hamburg quarters.

ROOTS IN HAMBURG

"Roots", which will become Germany's highest timber building, will literally take roots in the Hamburg HafenCity and will rise to a height of 73 metres. The building was consciously designed as "Entrée" to the Elb bridges quarter, one of the most trendy district of the city. On a total of 20 usable storeys (out of which 16 have been designed as timber construction), this outstanding building will give home to apartments, office rooms and exhibition areas of the German Wild Animal Foundation. Rubner Holzbau is responsible for professional and on-schedule implementation of timber engineering works. Factory pre-fabrication of building elements will take place in the Lower Austrian Ober-Grafendorf site of the company. Roman Fritz, CEO of Rubner Holzbau, provides some insights into this forward-looking project, which covers a gross floor area of some 20,600 m^2 and provides home to 181 residential units. "With the implementation of this project, we will be able to demonstrate what timber engineering can accomplish. This project with strong symbolic character sets new standards in terms of sustainable design and densification of urban environments". Assembly period for this timber project will take only one year.

Implementation of this project within the tightly set schedule is enabled by special planning processes that have been developed by Rubner Holzbau for large-scale projects with prefabricated timber elements. "The earlier we – as timber engineering company – are involved in this planning process, the more time will be saved in implementation. Since timber engineering is based on factory pre-fabrication of large numbers of timber elements, it is a decisive factor to define all these details in advance. We therefore collaborate at a very early stage with building owners, architects, technical planners and all other parties involved in the project. This is the most efficient way to save precious time during construction phase", explains Andreas Fischer, CEO of Rubner Holzbau in Augsburg and leading company in the implementation of the Hamburg "Roots" project. Coming back to the earlier mentioned CO_2-issue: More than 5,500 m^3 of coniferous wood, out of which 4,430 m^3 of cross laminated timber and 820 m^3 of special woods will be processed by Rubner Holzbau in the implementation of this project. Compared to fabrication, transport and disposal of conventional building materials, this material volume reduces CO_2 emissions by approximately 26.000 tons.

LA FERME DU RAIL IN PARIS

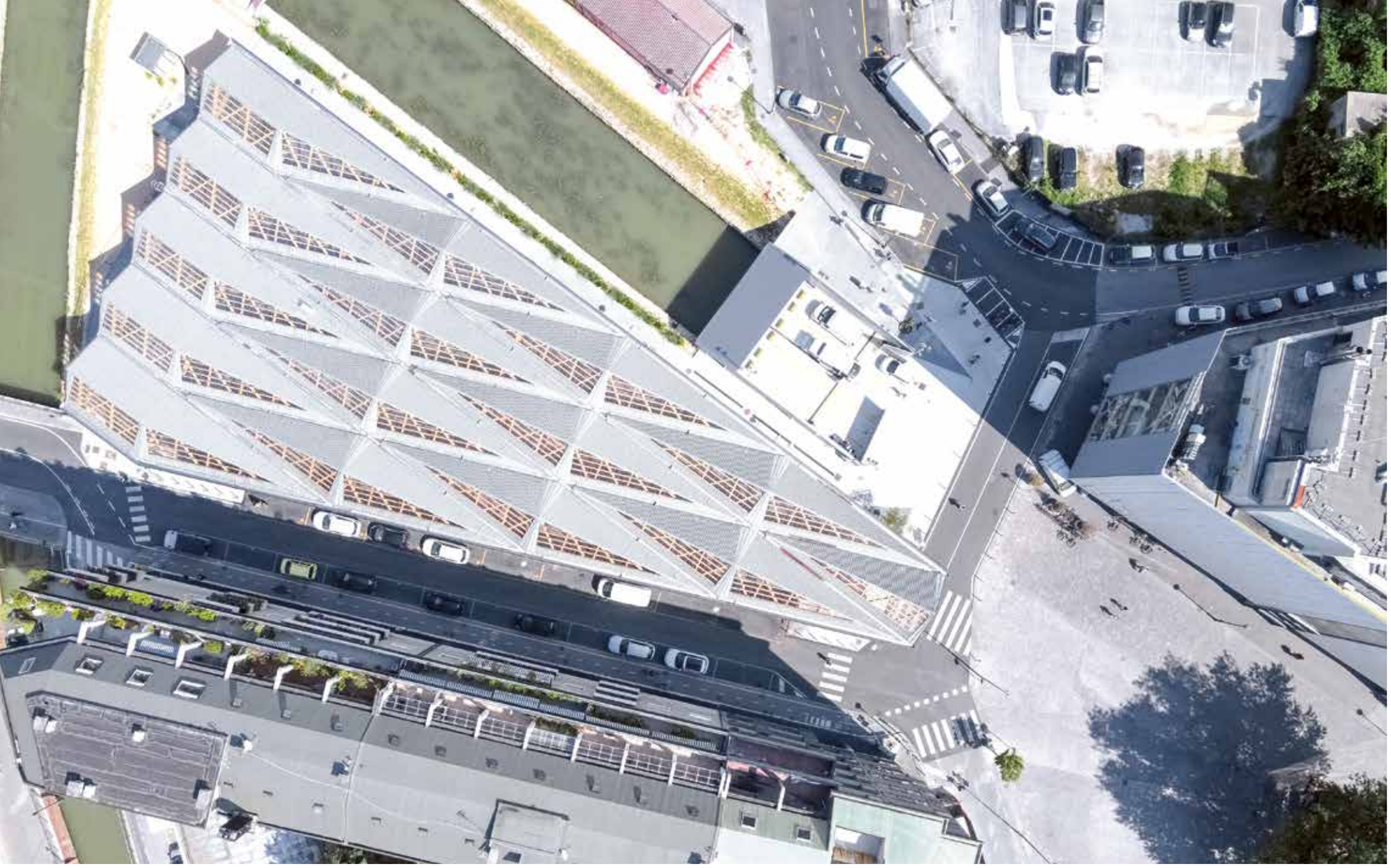
"La Ferme du Rail", which is being implemented in the 19th arrondissement of Paris is one of the winning projects of the "Réinventer Paris" Award (Reinvent Paris). In the scope of the largely dimensioned initiative of the Paris Mayoress Anne Hidalgo – more than 600 project proposals have already been submitted since the beginning of these activities - the main issue is to reconsider the way we live, travel and build in Paris". The main objective of the Masterplan, which includes 23 project sites, is to develop innovative urban projects in the French capital. The sector in located in an area between the Ourcq Canal, which connects Paris to Seine-et-Marne and attracts many hikers, and the small railway belt, a historic route, built during the times of the Second Empire between 1852 and 1870 under Napoleon III.

The project includes residential buildings with community areas, students' residence and a social reintegration centre for socially disadvantaged and deprived people (Association Work & Life), combined with agriculturally used surfaces, including a spaciously designed greenhouse, fruit garden, mushroom garden, chicken coop, beehive and natural pond. The restaurant, which is open to external visitors, and operated under the slogan: "Eat well and live better. Great products, local suppliers and love", focusses on quality of locally produced and harvested products.

The Rosny-sur-Seine Rubner Holzbau team complied with many of the requirements linked to this project tender, e.g. to use timber from French origin and materials from local areas, such as straw from the Île-de-France region for the straw-insulated timber constructions. Rubner Holzbau France took care of prefabrication works for 80 m^3 of glued laminated timber elements and 300 m^3 of solid timber.

URBAN TIMBER ENGINEERING

EVERYTHING UNDER ONE ROOF



The daily markets in the narrow streets of Venice are an adventure in itself. The atmosphere can best be described as a mixture of different smells, shouts of market traders and mood of visiting tourists and clients. This holds very much true for the "Mercato San Michele", certainly one of the most traditional local supplier markets in the Venetian city district of Mestre.

Due to its size and high population density (more than 200,000 people live in this area), Mestre, the gate to Venice, is frequently called a city of its own. The district's infrastructure has already got a little bit long in the tooth. Public administration, represented by the Insula S.p.A., the executing agency of the municipality of Venice charged with municipal maintenance works, infrastructure, and construction issues, has therefore instructed the demolition of the old and temporary market and the construction of a new, modern, and permanent market hall. Rubner Holzbau has successfully submitted the public tender and finally has been awarded the execution contract.

Not only project implementation schedule but also structural conditions on site were very tightly set. No more than 5 months had been scheduled by municipal institutions to demolish the old market installations, and to build a new market hall. Directly adjacent residential buildings as well as heavily trafficked roads in the market surroundings set additional challenges to logistics and construction site management. Yet it is exactly under these difficult conditions that timber constructions can play to its strengths. High prefabrication rates in the production sites of Rubner Holzbau in Brixen considerably reduced assembly periods on site. Just-in-time delivery allowed to reduce as much as possible the scarcely available storage room on these confined construction sites. Peter Rosatti, CEO of Rubner Holzbau Brixen, explains: "we have designed very distinctive, rhomboidal roof elements for the Mercato San Michele, which have the form of a tetrahedron. All required macro-elements were delivered to be assembled on the ground within the shortest possible time, using only minimum space and allowing their quick positioning in the correct roof section. It was thus possible to efficiently plan the intervention of the on-site assembly teams and to conclude the project within the set schedule." Construction was scheduled for a period of five months out of which only two months were scheduled for prefabrication of the seemingly light but at the same time very stable timber structure elements of the market hall.

All structural details of this construction satisfy everyday needs and requirements of visitors, dealers and clients. An additional objective was to lead the flow of visitors as frictionless as possible through the market sector creating, at the same time, enough free space in front of the 36, now stationary market shops. The relatively low weight of timber was an additional plus. Due to this structural benefit, it was possible to erect the entire roof structure on only 26 steel posts, which are positioned right in the middle of the free areas. At the front sides of the shops, 70 cm high timber beams with span widths of twelve metres (with no other support) not only provide structural stability but also open spaces. Market visitors highly value the fact that these beams are also used for the labelling of the shops beneath, which allows easy and quick orientation within the market hall and at the same time provides additional structure to the sector.

The total surface area of the Mercato San Michele in Mestre covers 2,000 m^2, out of which 1,100 m^2 are used by the shops. The newly built market hall appears as open and spaciously designed area where visitors and clients can freely move and still enough space being available to allow deliveries to the shops by handcarts. Particular importance was attached to sufficient air circulation, which serves to regulate the temperature inside the market hall. The lowest point of this rhomboidal roof structure is located at a height of 4.5 metres, i.e. some 2 metres above the upper edge of the market shops. Each roof element has

Completion: 2019
Building owner: Municipality of Venice, Insula S.p.A. (IT)
Architects: Insula S.p.A. in collaboration with Arch. Daniele Levi, Venice (IT)
Roof surface: 2,200 m^2
Retail areas: 1,100 m^2
Glued laminated timber: 480 m^3 in spruce
Cross laminated timber: 130 m^3
Photography: Giorgio De Vecchi – gerdastudio

openings along the ridge beam to secure the flow and exchange of air, above all in the summer months. The south-facing roof elements are made of opaque sheet elements, the natural (glare-free) lighting is achieved by the north-facing translucent roof elements. Hence light direction within the market hall follows the position of the sun, which is highly appreciated both by shop owners and market visitors.

For the execution of this project, Rubner Holzbau used 480 m^3 of glued laminated timber in spruce and 130 m^3 of cross laminated timber – thus providing natural binding of some 462 t CO_2. Very often, these key data are nowadays the reason why an increasing number of infrastructure projects are consciously being executed as timber constructions. Municipalities assume a leading role and specifically invest in ecologically sustainable projects. The San Michele market in Mestre is one additional example for this sustainable construction method and the modern continuation of traditional timber constructions in and around Venice. After all, parts of the foundations of the lagoon city itself were made of load-bearing timber structures.

MUNICIPAL ARCHITECTURE

ENVIRONMENTAL SCHOOL

The Paul-Gerhardt-School in Dassel has been awarded the title of "Environmental School in Europe". It was therefore a reasonable and logical decision to choose timber as construction material for the new sports hall. Inaugurated by the end of 2020, this two-field sports hall offers enough space for PE classes, worship services and extra-curricular activities.

The Protestant Paul-Gerhardt Grammar School (PGS) in Dassel not only is home to some 800 students who fill the spaciously designed campus, but also to more than 150,000 bees which - being part of the three bee colonies that have been domiciled on the school premises - busily collect the pollen to secure the school's own honey production. This specific project, but also many other school projects have led to the PGS being repeatedly awarded the title of "Environmental School in Europe". It therefore seems to be the only logical consequence that the winning design that had been submitted by MOSAIK architects in Hanover proposed to build the new sports and multi-purpose event hall as timber construction. The building owner - the school's administrative body of the Evangelical-Lutheran State Church of Hanover, has willingly accepted this input, and from the very beginning was fully convinced of the building's high energy efficiency and of the sustainability of the concept.

Andreas Fischer, CEO of Rubner Holzbau Augsburg, is visibly proud to have successfully implemented one additional project within the educational sector: "Structural timber engineering constructions have finally reached institutional decision-makers. Fortunately, the benefits of this construction method are increasingly being recognised and then implemented. The newly built sports hall

will also help to familiarise students of the Paul-Gerhardt Grammar School with the possibilities that are offered by timber - one of the most sustainable construction materials of all. Indirectly, this project also fulfils a valuable and important informative and educational task."

The newly built sports hall is nothing but the consequent and logical enlargement of the primary building structure that had been installed back in the 1950s and had later been extended. At the same time, this new, two-storeyed building with sports equipment room and changing facilities is harmonically embedded into the hillside location of the structure. The timber façade of the annexed structure has been deliberately designed in a restrained manner readopting the existing artificially greyed cladding of the original school building. The interior of the sports hall, however, is dominated by bright, natural colours, timber surfaces, light green trapezoidal sheet as ceiling cladding and plenty of natural daylight. Some 230 m² of timber-glass-façade have been used to achieve this effect. The key figures of this new two-field sports hall speak for themselves: net floor area measures some 1,740 m^2, out of which approximately 1,000 m^2 are used for the proper sports hall with its two sports fields. With a clear height of seven metres, the hall has a total cubage of 15,500 m^3, and therefore offers sufficient space for all types of sports including high-rocketing balls and rising emotions. Some 2,175 m^2 of wall and 1,757 m^2 of ceiling surfaces were implemented for the entire building envelope. 1,375 m^2 of Douglas fir have been used for façade cladding. One of the most important interior elements are the two telescopic stands, one with 60 additional seats for visitors of regular handball matches and one with 300 additional seats for church service visitors. Moreover, the sports hall is equipped with a climbing wall, one additional classroom and a seminar room with a kitchen unit, which can be used as club room for extra-curricular activities. The installation of an elevator secures barrier-free access to all building levels - a must for a school complex run and managed by an ecclesiastic organisation that has committed itself to the idea of educational inclusion.

The main technical challenges of this building were determined by the impressive span widths of the beam elements required for the hall roof. The glued laminated timber trusses spanning the two sport fields and stands measure 1.80 metres in height and impressive 27 metres in length – which was certainly challenging in terms of transport requirements from Rubner production site in Ober-Grafendorf to the city of Dassel in Lower Saxony, in the north of Germany. The same applies to the inside and outside wall elements made of cross laminated timber, which had to be transported from the Italian-based production site in Brixen to Dassel. Magnus Birkmeir, responsible Project Manager at Rubner Holzbau Augsburg, explains: "if globally analysed, production and transport of this kind of timber elements cause considerably lower greenhouse emissions than production and transport of mineral building materials". This specific feature of timber constructions and the fact that timber, being a renewable resource, is able to store CO_2 over its entire life cycle were some of the decisive factors for the PGS sports hall to be shortlisted for the timber construction award of the Federal Land of Lower Saxony in 2020.

Completion: 2020
Building owner: Evangelical-Lutheran State Church of Hanover (GER)
Architects: MOSAIK architekten bda, Hanover (GER)
Structural engineering: Sellmann Ingenieure, Hanover (GER)
Timber-glass façade: 224 m^2
Façade cladding: 1,375 m^2 in Douglas fir
Glued laminated timber: 91 m^3
Cross laminated timber: 163 m^3 for slab structures, 189 m^3 for wall structures
Wall surface: 2,175 m^2
Roof surface: 1,757 m^2
Photography: Frank Aussieker

EDUCATIONAL AND RESEARCH CENTRE

TIMBER ENGINEERING SETS TRENDS

Once again Rubner Holzbau has proven that almost no limits can be set to structural timber engineering. The company's most recent major contract in Rotholz (located in the municipality of Strass in the Ziller Valley, Tyrol) confirms this statement. With the construction of three interconnected buildings – secondary school, boarding school and research institutes – the client has shown visionary and far-sighted thinking. The modern campus has been built as hybrid construction and one of the buildings has even been certified as "climate active gold standard" building.

The newly built educational and research centre in Rotholz, located in the Ziller Valley, is an outstanding structure for several reasons. For the first time, the HBLFA (Austrian Secondary School and Research Centre) Tyrol combines - under one single roof - the transfer of educational content with the genesis of new knowledge by targeted special research work. With the beginning of the new academic year in autumn 2020, more than 1,000 students, 250 teachers, employees and apprentices will enlive the 13 classrooms, 200 boarding school places, the numerous working and practice rooms as well as the spaciously dimensioned teaching kitchen. The campus sector, which covers a total surface area of 30,000 m² houses three interconnected buildings - boarding school, secondary school with gym hall, and research institute with teaching facilities. The architect's association BME-Adamer°Ramsauer, under the lead of architect DI Karl-Brodl, was charged with the execution of the lead design. Architect Klaus Adamer (from Architekten Adamer°Ramsauer ZT Gesellschaft OG) explains the concept behind this building arrangement: "Each individual building has its own identity. In accordance with the ecological values of this school type, the secondary school and the boarding school building have been designed in their upper storeys as timber structures, whereas the research and service building has been built as concrete structure due to hygiene standards required for production and laboratory facilities.

The team of the Villach branch office of Rubner Holzbau was charged with execution and assembly design of this new construction. The executed building components comprise: a timber skeleton structure for the school, timber-concrete compound structures for the upper ceilings and the roof, façade elements made as post-and-beam constructions, prefabricated larch façade elements for the secondary school and the boarding school building and finally cross laminated walls and cross laminated ceilings for the boarding school building.

Sustainabilty was the major issue during design and implementation of the interconnected elements of this educational and research campus. As a matter of principle, Rubner Holzbau has only processed PEFC-certified wood. Only domestic larch has been used for the façade of the HBLFA Tyrol. Special attention has been paid to the ecological footprint, in general, and to lowest possible CO_2 emissions, in particular, as far as fabrication, transport and future forest renaturation are concerned.

The school building has a gross floor space of 10,373 m^2 with an enveloping surface of 10,984 m^2, the boarding school has a gross floor space of 5,682 m^2 and an enveloping surface of 4,144 m^2. In both buildings, timber has been consciously used as visible construction element. The beams in the classrooms not only remain visible but literally tangible. All prefabricated façade elements are made of untreated, vertically arranged larch battens with high-quality timber-aluminium windows. All classrooms and corridors are equipped with wooden floorings. In total, Rubner Holzbau used 1,400 m^3 of spruce cross laminated timber material (with maximum spans of 27.5 m), 400 m^2 of timber-glass façade, 2,500 m^2 of façade elements, 4,300 m^2 of roof and ceiling elements, 2,200 m^2 of board stacked ceiling in visible quality and 2,500 m^2 of cross laminated timber wall in visible quality.

High factory prefabrication rates of all timber elements have considerably contributed to rapid and efficient construction of the buildings. In addition, impacts on the catchment area (environment and neighbourhood) have been kept as low as possible. Günther Meinhardt, project manager within the Villach team at Rubner Holzbau, explains the meticulously calculated assembly concept: “Production processes in our Ober-Grafendorf factory have been perfectly dovetailed to on-site assembly conditions, which allowed to ideally met stringent deadlines and schedules by largely prefabricated and just-in-time delivered building elements to the construction site. Backed by our well-planned assembly concept we have been able to meet the challenge to protect the large-scale timber-concrete compound ceilings in visible quality over a period of ten weeks until the roof was finally sealed. Individual sections, staggered floor by floor, were assembled in a way to protect the below areas. No weather condition whatsoever could therefore impact the building structure.

The entire energy concepts of the educational building, the boarding school and the research institute are well interconnected. The roof is equipped with a photovoltaic power plant with a capacity of 56 kWp, all three buildings have been connected to the biomass-local heating network of Rotholz, green areas on the roofs absorb and delay energy input and contribute to thermal stabilisation of the buildings. By designing the buildings as solid and highly insulated building structures, by thoroughly selecting all used materials, by providing controlled ventilation, waste heat recovery, and optimum sun protection systems, and by implementing many other measures regarding execution and exploitation, all three buildings meet the high requirements set for climate active building standards.

The new school building achieves a total of 943 out of a possible 1,000 points. With 1,000 out of possible 1,000 points the boarding school even achieves the highest possible score of the climate active GOLD Standard! With 748 ouf of a possible 1,000 points, the administrative and research building (which has not been executed as timber structure) meets silver sustainability standards. These impressive climate standards awarded to the HBLFA Tyrol confirm and prove that transfer of knowledge and know-how in the field of agricultural and food-related issues can be perfectly integrated into a timber-built educational environment.

Completion: 2020
Building owner: Landwirtschaftliche Bundesversuchswirtschaften GmbH (BVW), Wieselburg (AT)
Architects: Company association BME + Adamer°Ramsauer, Vienna + Kufstein (AT)
Assistance to building owner and local construction supervision: Vasko + Partner, Baumanagement Forstner
General contractor: Company association Porr/Rieder, Rotholz (AT)
Structural engineering: Lackner & Egger ZT, Villach (AT)
Glued laminated timber: approx. 1,400 m³
(Type of wood: spruce, max. spans: 27.50 m)
Timber-glass façade: approx. 400 m²
Façade elements: approx. 2,500 m²
Roof and ceiling elements: approx. 4,300 m²
(max. 360 x 800 cm, fire protection R 60, surface: Herakustik)
Board stacked ceiling: approx. 2,200 m² in visible quality
(element size: 2.95 x 7.20 m, thickness: 10 - 14 cm)
Cross laminated timber wall: approx. 2,500 m²
(element size 3.00 x 7.00, thickness 10 and/or 18 cm, surface: visible)
Photography: Adrian Hipp

IMPRESSIVE ECO-BALANCE

RECORD-BREAKING CONSTRUCTION

The newly built Stromlo Leisure Centre (SLC) in the Australian city of Molongo is a “landmark” for many reasons. Building owner, architects and client decided to implement a timber roof structure to create a direct architectonic bond to the surrounding Stromlo Forest Park. The visible use of glued laminated timber is an absolute novelty for this region of the world.

The location of the Stromlo Leisure Centre directly influenced the planning and design of the entire project. The municipality of Molongo is located at the Stromlo Forest Park, at the foot of Mount Stromlo, home to the world-famous Mt. Stromlo Observatory. More and more people are moving to this region that is located west of the city centre of Canberra. Reason enough for the Australian Capital Territory administrations to enlarge leisure facilities and installations in this area. Cox Architecture has developed – at least for Australian standards – a quite unusual solution: the use of glued laminated timber as visible and load-bearing elements for the spanning glulam roofing structure.

A project of this size requires implementation partners with appropriate and proven expertise. Backed by its worldwide reference projects with comparable (or even larger) dimensions, Rubner Holzbau in Brixen finally convinced the key-decision makers of the project. The fact that with Theca Australia Pty Ltd. Rubner Holzbau already had a reliable partner on site was certainly an additional plus. In the last few years, these two companies had jointly executed the library in Marrickville and the shopping centre "The Link" in Chadstone and both projects have been awarded the highly renowned Australian Timber Design Award. This successful cooperation has now been resumed in the implementation of the Stromlo Leisure Centre. Structural implementation in Molongo was executed by the company Kane Constructions Pty Ltd.

To understand the technical challenges of this spanning glulam roofing structure of the pool hall, it is necessary to have a closer look on the dimensions of the project. The main building with a base area of some 5,400 m^2 is dedicated to aquatic sports including an eight-lane 50 metres lap and competition pool, a 20-metres learn to swim pool, slides, toddler's pool, and splash park. The adjacent areas house a gym and fitness studio, a café, a creche and swim store. The investment amounted to 36 million Australian Dollars, which equals some 23 million Euro.

This type of "water world" asks for a material that is neither impacted by high temperatures nor by high humidity. Moreover, visual appearance and haptic qualities were required to relate to the surrounding scrubland. These technical requirements literally plead for natural, low-maintenance and durable glued laminated timber. In addition, glulam offers almost the same load-bearing performance as steel yet with much lower weight. The material secures high fire-resistance rates, and - compared to conventional massive structures - higher seismic stability as well as resistance against aggressive substances. On site, the material scores with high prefabrication rates and provides structures, which are free of thermal bridges over long spans. This is also the case in the Stromlo Leisure Centre, where main beams have a length of more than 47 m.

Rubner Holzbau was charged with the entire structural design, workshop designs, fabrication, logistics and technical support for the assembly of all individual construction elements on site. After having concluded the fabrication process in Brixen, all structural elements such as beams, and struts were shipped in containers to Australia and then transported to

construction site in Molongo by heavy-goods trucks. Each single of the 18 structural elements with an individual weight of almost 19 tons was then correctly positioned with the help of a crane within only 30 minutes. Thanks to high prefabrication rates, final assembly of one element only required the support of 4 workers.

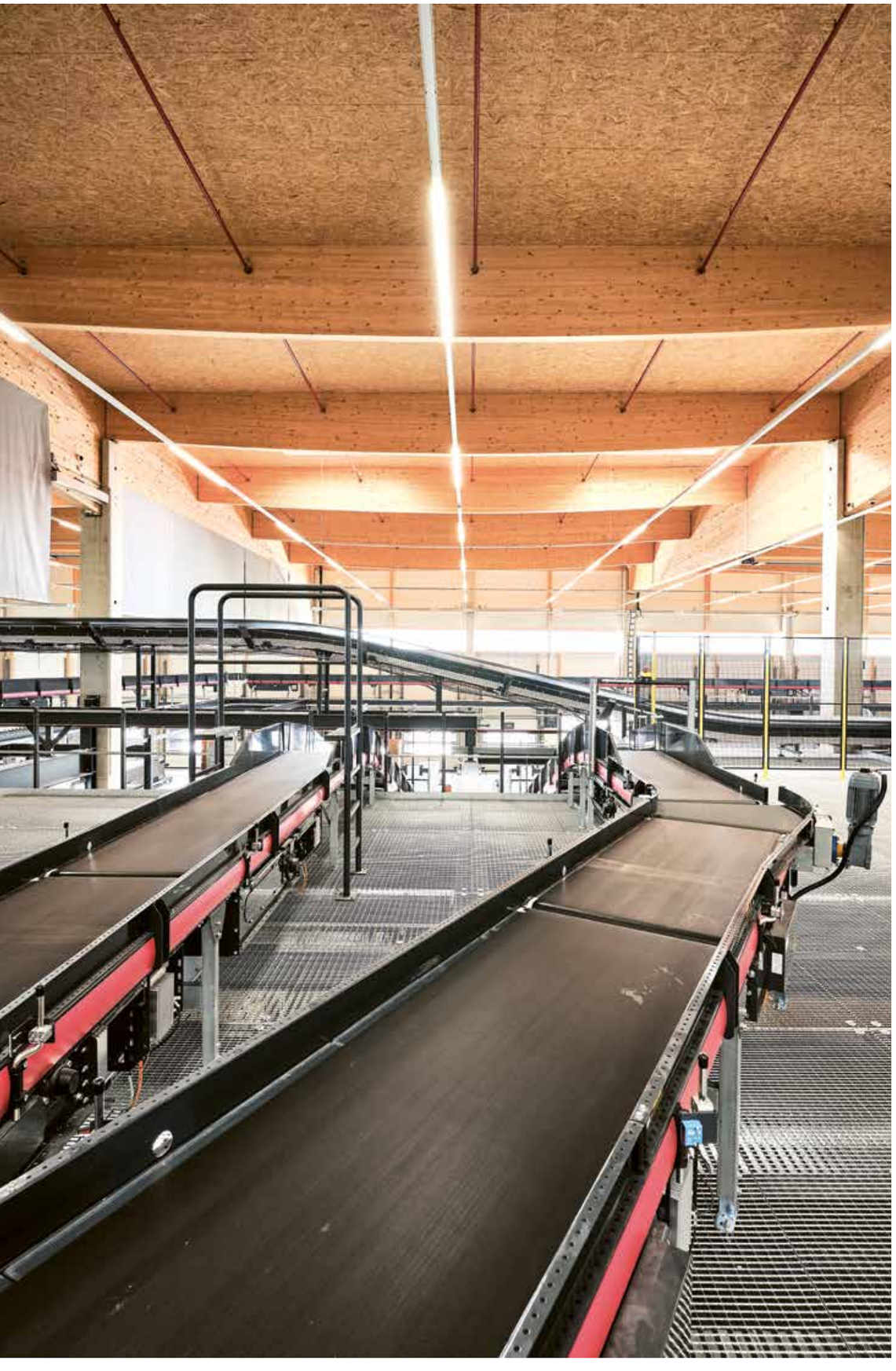
Glued laminated timber elements are made 100 % of spruce, which - with its bright and earthy colours perfectly complements the colours chosen for inside materials. All remaining surfaces in the pool hall have been chosen as robust, functional, and unprocessed materials selecting traditional Australian colours, such as warm orange tones, yellow or blue. However, largely dimensioned timber constructions in this visual quality are quite unusual in Australia. On the occasion of a TV interview with Sports Minister Yvette Berry, she confessed that the visual timber elements on site had clearly stolen her the show.

A total of 350 m^3 of glued laminated timber were processed in this project. Therefore, with savings of approximately 226 t CO_2, the ecological balance of this roofing structure is more than positive. In addition, the forest on the other side of the world secures a rapid regeneration: in Austria, the country where Rubner Holzbau sources and processes the wood for its structures, some 30 million m^3 of wood are re-growing. This means that the 350 m^3 of timber that were processed for the Stromlo Leisure Centre are compensated by natural re-growth in only 10 minutes.

For Peter Rosatti, CEO of Rubner Holzbau in Brixen, this project is an architectonic landmark Down Under:

"With the execution of the Stromlo Leisure Centre we have implemented the longest spanning glulam roofing structure throughout Australia. From the very beginning this project had a role model effect. Static properties, design, durability, and sustainability of the natural material wood convince more and more clients in Australia. It seems that we not only have put our finger on the pulse of time but that we are also setting trends."

Completion: 2020
Building Owner: Australian Capital Territory (ATC) Government, Canberra (AUS)
Client: Kane Constructions Pty Ltd., Manuka, Canberra (AUS)
Architects: Cox Architecture, Kingston, Canberra (AUS)
Structural engineers: Sellick Consultants Braddon, Canberra (AUS)
Glued laminated timber: 348 m^3
Steel fittings: approx. 20,500 kg
Wood type: spruce
Span width: approx. 28 m
Clearance between beams: approx. 37.3 m
Length of main beams: approx. 47 m
Photography: Evolve Timelapse



LARGEST POSTAL LOGISTICS CENTRE

DELIVERED WITHIN RECORD TIME

For the construction of its largest logistics centre, the Austrian Postal Service Agency has opted for timber – the most natural building material of all. In association with the building company Granit, Rubner Holzbau Ober-Grafendorf has executed the supporting structure for the hall, roof elements and outside walls in panel construction – all these works within an unbelievably short and almost record-breaking time of only three months.

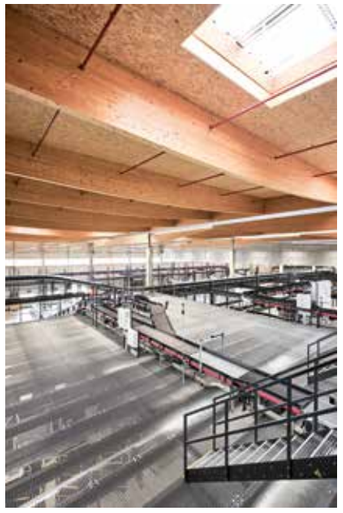
Growing online- and multi-channel trade automatically leads to rapidly progressing globalisation. More and more people order from shops all over the world and have themselves delivered the products at home. Last year alone, 166 million parcels were transported, this is a plus of 30 % compared to the previous year. This development deeply impacts the logistics branch and thus the Austrian Postal Service Agency, which is responsible for organisation, distribution and delivery of the largest amount of parcels delivered in Austria. The Austrain Postal Service Agency ist responding to this trend and has commissioned the construction of a new parcel logistics centre in the geographical heart of Austria. Under the lead of the company association formed by Granit/Rubner as general contractor, Austria's largest and most state-of-the-art postal logistics centre is being build in Kalsdorf south of Graz.

Even from the constructional engineering point of view, logistics centres are far more than merely four walls and an enclosing roof structure since the purpose of this kind of building is to create value. Yet this purpose can only be fulfilled if the building meets special functional requirements that are set by individual process features. It comprises flexible areas, it is characterised by ecological sustainability and low energy consumption, and in addition, the building integrates additional services. In short: construction requirements are high, in terms of architecture, function and investments. Designing this type of modern logistics centre (which also complies with future requirements) needs special technical know-how and expertise – two features, which Rubner Holzbau has been able to develop by executing many other international projects of similar dimensions.

The dimensions of this building are outstanding for Austria: the area measures impressive 167,500 m^2, gross floor area of this logistics centre amounts to 27,170 m^2 with a construction volume of 300,000 m^3. The logistics centre, including office section and gatehouse, will be the workplace for 280 postal employees. Once concluded, this logistics centre will be able to sort and forward up to 13,500 parcels per hour. Investment for this new and modern Austrian postal logistics centre amounts to some 60 million Euro.

Increasing logistics volumes require space and thus appropriate span widths. Timber construction is the ideal solution to this problem since timber combines maximum load-bearing capacities with low tare weight - compared to other building materials. The glued laminated timber construction is made of spruce beams with sections of 26/204 cm up to 26/260 cm and spans of up to 30 metres. A total of 3,000 m^3 of glued laminated timber and 75 m^3 of cross laminated timber were used. This structure allows to build extraordinarily large roof elements without impairing the flexible use of the large hall area by supporting pillars. In this specific case, prefabricated roof elements with side lengths of up to 18 metres cover an overall roof surface of 22,300 m^2. From below, elements are OSB panelled and comply with fire resistance class REI 30, which is required for logistics centres. In addition, some 8,300 m^2 of insulated compound façade elements have been installed in the outside area.

Rubner Holzbau has been charged with construction and detailed engineering, fabrication, logistics and implementation of the hall's glued laminated timber supporting structure, roof elements and outside walls in panel construction. The main factor to secure successful and on-time implementation of a project with these dimensions is smooth interaction and coordination of all works on site: civil engineering, building construction, timber engineering and façade assembly. To comply with defined process workflows and to secure tight implementation schedules, continuous



Completion: 2020
Building Owner: Post & Co Vermietungs OG, Vienna (AT)
Architects: IndustriePlan S+F ZT, Graz (AT)
General contractor: Company association Granit/Rubner
Structural engineering: VP3 ZT, Graz (AT)
Gross surface area: 27,170 m^2
Construction volume: 300,000 m^3
Glued laminated timber: approx. 3,000 m^3 in spruce (beam sections 26.0/204-260-204, max. spans 30 m)
Roof elements: approx. 22,300 m^2 (max. element dimensions 18 m, fire resistance class REI 30, soffit OSB)
Cross laminated timber: approx. 75 m^3 (element dimensions 8.00/1.10 m, thickness 6 cm, industrial surface)
Photography: Michael Liebert

site supervision and coordination of subcontractors was secured by a permanent construction site supervision team of Rubner Holzbau. Since the centre's construction site is located in the direct vicinity to the landing area of the Graz-Thalerhof airport, all building activities had to be perfectly coordinated with the aviation department of the Ministry of Transport.

The major goal and target was to have the building structure sealed within a period of only three months (from the beginning of construction works in May until end of July). Usually, this is not a difficult target to achieve for Rubner Holzbau Ober-Grafendorf but in a project with these dimensions it was clearly a challenging parameter. The fact that the project was fulfilled within the set schedule is once again due to one of the main benefits offered by structural timber engineering. Thanks

to high factory prefabrication rates, it was possible to coordinate production, logistics, and on-site execution in a way to efficiently use all capacities available.

Representing a domestic logistics company, the Austrian Postal Service Agency has set itself the objective to act and operate as eco-friendly and sustainably as possible. This includes, of course the agency's sites such as this new logistics centre in Kalsdorf near Graz. All green areas surrounding the logistics centre have been planned by placing major focus on biodiversity. In addition, the areas are cultivated in an eco-friendly manner. Some 1,500 photovoltaic modules have been installed on the roof built by Rubner Holzbau Ober-Grafendorf. The plant has a total nominal capacity of 499 kWp. These photovoltaic modules cover large parts of the energy that is required for the operation of the approximately 2 kms long parcel conveyor plant inside the building. One additional ecological aspect that characterises this project is that only Austrian raw material has been used for this large-scale project. All timber used for hall construction has been cut in the Steiermark region.

Roman Fritz, CEO of Rubner Holzbau, gives more details: "With the construction of Austria's largest and most up-to-date postal logistics centre, we have implemented a timber engineering model project in many respects. It starts with the fact that all timber that has been used for this project in Kalsdorf near Graz originates from local forest enterprises and has been processed by Rubner timber industry in Rohrbach an der Lafnitz. Moreover, we have once again proven that the use of timber - this open-pored natural building material - is a highly reasonable construction alternative. Due to its temperature-balancing and moisture-regulating properties, timber is able to positively impact working environments, even under full operation. By complying with extremely short project implementation schedules, which has been achieved by large prefabrication rates in our Ober-Grafendorf factory, we have set new standards, and our competitors will be judged and assessed on the grounds of this new benchmark."

AUSTRIA

The Rieder Group with production sites in Maishofen (AT), Kolbermoor (GER) and Wisconsin (USA) has specialised on the production of solution-oriented, eco-friendly and economically profitable façades made of glass-fibre reinforced concrete. With sales partners in more than 50 countries, these innovative concrete products are being used all over the world. To enlarge production capacities at the Maishofen site, Rubner Holzbau has built two new halls using 1,500 m^3 of glued laminated timber and 9,500 m^2 of prefabricated façade elements. The timber construction with its widely spanned supporting structure allows the flexible use of these two, light-flooded halls with an overall usable building area of 4,400 m^2. Besides the flexible use concept, the harmonious integration of the building into the surrounding landscape – a building characterised by its architectonically outstanding and innovative façade solution -, and the connection to the already existing company infrastructure were essential requirements and the decisive criteria to opt for timber as construction material.

AUSTRALIA

Following the "Marrickville Library" and "The Link" in Melbourne - two projects that have been awarded several prizes, among others the Australian Timber Design Awards 2020, the new main stand of the Granville Park Stadium in Cumberland near Sydney is one additional successful project that is implemented in Australia by Rubner Holzbau Brixen and coordinated by the Australian partner Theca. Not only due to its timber structure, the new stadium perfectly fits into the surrounding park landscape. The stadium, which is home to the Two Blues Rugby Union Club, has a prominent cantilever roof that offers shelter to some 750 visitors. The entire roof and supporting structure have been factory prefabricated by Rubner Holzbau and shipped to Australia in eight containers.

UNDER CONSTRUCTION AND COMPLETED PREVIEW

GERMANY

On a 42,000 m^2 large premises located east of the Theodor-Heuss-Street, the city of Langenhagen (GER) is building a school with seven parallel classes for more than 1,700 students and 120 teachers. The school building planned as sustainable timber-concrete hybrid constructionm including a five-field sports hall, is characterised by its simple and functional basic structure. In the L-shaped complex that has been planned on the grounds of the design elaborated by the Cologne-based architect Prof. Gernot Schulz and the landscape architect Johannes Böttger, sports areas and school canteen are clearly separated from the administrative and educational areas. Rubner Holzbau fabricates, delivers and assembles some 3,234 m^2 of factory pre-fabricated façade elements, 6,420 m^2 of timber-concrete compound ceiling structures and 1,031 m^3 of glued laminated timber structures. In addition, some 4,515 m^2 of prefabricated reinforced concrete units and 1,063 m^2 of windows will be installed. Project conclusion is scheduled for the 2022/23 academic year, timber engineering works, however, shall be concluded by the 4th quarter of 2021 already.

RUBNER
holzbau

Italy
Rubner Holzbau S.r.l.
Via Alfred Ammon 12
39042 Bressanone (BZ), Italy
Phone: +39 0472 822 666
holzbau.brixen@rubner.com

Germany
Rubner Holzbau GmbH
Am Mittleren Moos 53
86167 Augsburg, Germany
Phone: +49 821 710 6410
holzbau.augsburg@rubner.com

France
Rubner Construction Bois SAS
36 avenue des Frères Montgolfier
69680 Chassieu, France
Phone: +33 472 790 630
direction.france@rubner.com

Chemin des Marceaux
78710 Rosny-sur-Seine, France
Phone: +33 130 945 808
direction.france@rubner.com

Austria
Rubner Holzbau GmbH
Rennersdorf 62
3200 Ober-Grafendorf, Austria
Phone: +43 2747 2251-0
holzbau.obergrafendorf@rubner.com

Branch Office Villach
Kanzianibergweg 14
9584 Finkenstein, Austria
Phone: +43 4254 50 444-0
holzbau.villach@rubner.com

Imprint:
Editor and responsible for the content: Rubner Ingenieurholzbau GmbH, holzbau@rubner.com, www.rubner.com/holzbau

Concept, layout & design: Serendipity GmbH – Agency for Advertising | Public Relations | Events, office@serendipity.ag, newsroom.serendipity.ag
Pictures: Garbe Immobilien-Projekte, Michael Liebert, Giorgio De Vecchi – gerdastudio, Frank Aussieker, Adrian Hipp, Evolve Timelapse, Gernot Schulz Architekten, DWP, Rieder Gruppe.