

# Wood Culture

**21** Construction competence  
in timber engineering



**Better with wood**

01 | 2023

**RUBNER**

04

Projects, such as the four spectacular and eye-catching, visionary designed pavilions on the Dubai Expo demonstrate what modern timber engineering is capable of.



## 21<sup>st</sup> century construction material.



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Technical University of Munich (TUM) at the Olympia Park Campus. Literally outstanding: the cantilevered roof with 150 meters in length and an impressive protruding extension of 18.3 meters.

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Standardised objects and serial constructions: nine triple-purpose sports halls implemented in Berlin in modular type construction.



Rubner has formulated a clear vision for the future: „We build a greener world – with the help of timber.“ We underline our targets by being a competent and reliable partner. Our major aim is to set standards in the worldwide timber engineering sector, to inspire people by the services that we render thus arising enthusiasm and interest for timber as building material.

We are really pleased and excited about the fact that more and more people – such as you for example – share our passion for timber, which is the 21<sup>st</sup> century building material. Today, it has become a matter of course to assume responsibility for our environment, which will be the living space for future generations to come. We create the necessary frame conditions for a more sustainable

future, we define climate targets, we build kindergartens and schools as timber constructions, and building with timber is being supported by funding programmes. These, and many other measures are clear, and unmistakable signs of change in political and social environment.

“I am more interested in the future than in the past, because the future is where I intend to live.” Today, this Albert Einstein quote is more topical than ever before. It is no longer the question whether or not timber can be used as structural building element since Rubner has been demonstrating for almost 100 years how this material can best be implemented in the modern timber engineering sector, namely in a visionary, inspiring, path-breaking, efficient, eye-

catching, and passionate way. Being committed to this high standard, the company with its 500 passionate employees is undertaking every possible effort to implement these pioneering and ground-breaking projects in cooperation with clients, architects and planning entities. Some of these projects, we present in this new Wood Culture 21 Edition.

Yours truly

Wolfgang Walcher  
CEO, Rubner Ingenieurholzbau







The inner part of the UK Pavilion is designed as curved hollow space with a wall composed of LED elements where words and sentence fragments are displayed.

# Timber engineering worldwide acknowledged

The Dubai World Expo was a performance exhibition for Rubner, which was witnessed by an international audience with the aim to surprise and fascinate people and to inspire them for the future.

The 2020 Dubai Expo was eagerly expected and due to Covid 19 restrictions, the World Expo had to be postponed and finally took place from October 1<sup>st</sup>, 2021 until March 31<sup>st</sup>, 2022. For Rubner it was the perfect platform to prove the company's level of performance, to set standards in the worldwide timber engineering sector and to get people enthusiastic about this 21<sup>st</sup> century building material.

The foot of the tree represents the access area to the pavilion. The limiting wall is made of curved timber elements, which provide a sense of movement. The footbridge is seamed by more than 210 semi-circular elements, the so-called "ribs", with a radius of 1.3 meters. A total of approximately 190 m<sup>3</sup> of glued laminated spruce timber and approximately 30 m<sup>3</sup> of Nordpan (a Rubner group company) three-layer panels were used.

## Azerbaijan Pavillon Seeds for the Future

The leaf-shaped roof – a construction inspired by nature – was aimed to inspire visitors to place their individual daily decisions in a wider context so that they become aware of environmental impacts. The pavilion itself is composed of three, seamlessly interconnected structures – the tree, the agora, and the footbridge. The tree, composed of 141 arched glued laminated timber elements, seems to be reaching to the sky. The agora at the

## Belgium Pavillon Smart and Green Belgium 2050

Belgium presents itself as highly sustainable country. "The Green Arch" situated in the heart of the Expo's Mobility District exhibits the creation of interconnected, green cities through Belgium's scientific, industrial, and technological innovations. As outstanding architectonic feature, the pavilion is framed by trees and bushes over several floors, bringing additional life to the façade's timber construction. The structural



UK Pavilion:  
Glued laminated timber: 165 prefabricated boxes  
Total timber used: 1,000 m<sup>3</sup>



Azerbaijan Pavilion:  
Glued laminated timber: 190 m<sup>3</sup>  
Nordpan three-layer panels: 30 m



Oman Pavilion:  
Glued laminated timber: 275 m<sup>3</sup>  
Cross laminated timber: 60 m<sup>3</sup>



**„The pavilions that we have implemented are a strong and highly visible manifestation that timber – the most natural building materials of all – will play a crucial role in the future.“**

**Peter Rosatti**  
CEO, Brixen location

challenge of this project was the geometric complexity of the cladding and the interfaces towards the load-bearing steel substructure. To finally build the structure, Rubner used glued laminated timber elements and 110 m<sup>3</sup> of Nordpan three-layer panels.

#### **UK Pavilion Innovating for a Shared Future**

The concept of the UK Pavilion has been inspired by a project of the outstanding and exceptional scientist Stephen Hawking, in which he studied and researched on the possibilities of how mankind would be able to communicate with extra-terrestrial civilisations. Rubner was charged with design, production, transport, and assembly of the 165 prefabricated boxes made of glued laminated timber, cross laminated timber, and steel.

The inner part of the UK Pavilion is designed as curved hollow space with a wall composed of LED elements where words and sentence fragments are displayed. It took Rubner almost six months of continuous work to process some 1,000 m<sup>3</sup> of timber and to meet all the previously set design and schedule requirements.

#### **Oman Pavillon Oman – Opportunities over Time**

The Sultanate of Oman introduces itself as the country of frankincense. This precious, and valuable product has played a crucial role in the social and economic development of the country – from ancient times up to the present. The Pavilion was thus designed as an architectural tribute to this valuable resin and the outside structure of the Pavilion represents the form of the tree that produces this frankincense.

Rubner was asked to join the project team as consultant at a very early project stage so that the company was able to contribute with the choice of shape-giving materials and geometry. The tree structure made of glued laminated fir timber dominates the inside part of the Pavilion. The rear area of the Pavilion houses a one-storeyed shop area, made of CLT panels. Rubner used a total of 275 m<sup>3</sup> of glued laminated timber and some 60 m<sup>3</sup> of cross laminated timber to build this structure.





# Rubner. We live timber engineering.

A tree needs time to grow and to develop its performance and the same applies to our company Rubner. We, too, have been developing and growing over several decades to become your strong and reliable partner in the timber engineering sector.

We use the experience and strength that we have gained over many years to support our clients in sustainably shaping our living environment and our way of life. Being a specialised company in the field of engineered timber constructions, we believe that it is our major responsibility to decisively influence all developments that are being made in this sector. Our beliefs strongly impact our designs and implementation work, and therefore lead to projects, which positively change our life today and the life of future generations.

In our view, it is no longer the question of whether or not wood can be used in visionary construction pro-

jects. The question we are asking ourselves is rather how to best use this material. There is no doubt that wood is the building material of the future. We recognised this fact many years ago and have continuously advanced timber engineering development by further enhancing our specific know-how.

The passion and dedication we feel for the material, our vast know-how in the planning of individual solutions, and our large production capacities have contributed to become Europe's leading timber engineering company.

Our impressive, engineered timber constructions are inspiring. Our timber engineers share their experience and know-how and are pleased to accompany your project right from the preliminary project phase. We closely cooperate with our clients to create long-standing and fascinating individual solutions for your structure. The versatility and flexibility of wood

as construction material and the high prefabrication rate that we can offer, allow us to implement projects of any size competently, precisely, and quickly – even if the project is executed in combination with other materials.

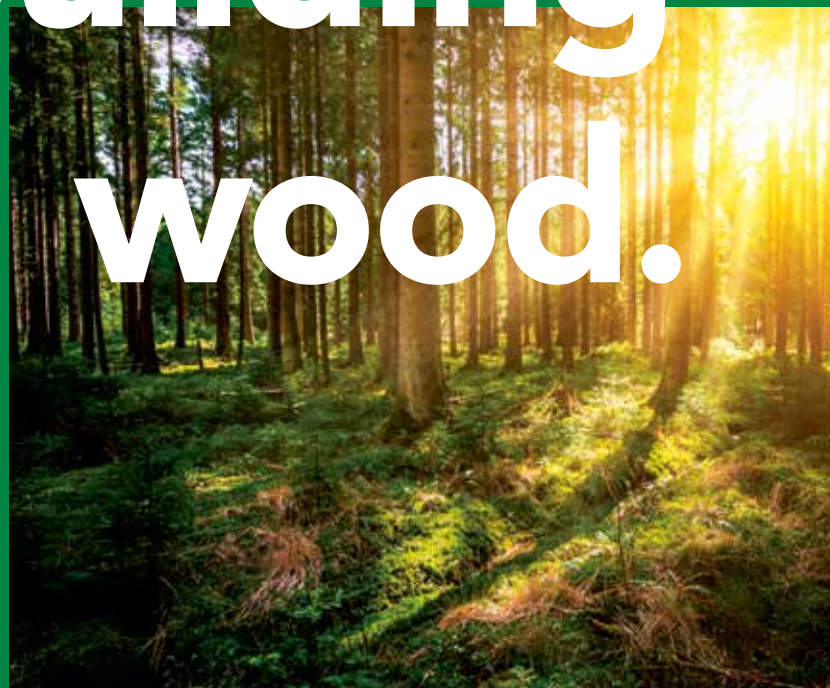
We work for the benefit of people. Our intention is to offer amazing services and to demonstrate that almost no creative design limits are set to this natural material. This is the starting point to commonly develop new ideas, to execute outstanding buildings and to create pioneering and ground-breaking solutions for the future.

**„Our mission is to set worldwide benchmarks in the timber construction sector, to inspire people with our services and to arise interest and enthusiasm for wood buildings and structures.“**

**Wolfgang Walcher**  
CEO, Rubner Ingenieurholzbau



# We build a greener world – by building with wood.



## Our vision and our promise to you.

### **To inspire on a sustainable basis**

Being a family-owned timber construction company, we believe that we are responsible for the preservation of an environment, which is worth living in. We offer the best conditions to transform this vision into reality since wood, which is the most important raw material we work with, directly originates from nature and is part of the focused solution to combat climate changes. The substitution of conventional building materials by wood or the reasonable combination of conventional building materials with wood allows to considerably reduce CO<sup>2</sup> emissions on the long run.

With our know-how and our work, we will strongly contribute to double the proportion of wood used in Europe's

construction industry in the next ten years. This vision complies with the present social development, which pursues proactive environmental protection. Our decision to share ideas, know-how and experiences starts from the desire to sparkle people enthusiasm and passion for construction solutions that adopt the most ecological of raw materials, wood.

### **A promise for the future**

For more than 95 years now, Rubner has been consistently promoting wooden buildings – with highly promising prospects for the future. If correctly used, even in combination with other building materials, timber can prove its advantages. This is demonstrated by the outstanding engineered timber structures, that

have been executed by our clients all over the world.

Short assembly periods supported by high prefabrication rates, availability of additional usable area due to optimised wooden structures, and increased safety due to calculable fire performance. Our promise includes a recommendation for the future and for the living environment of future generations. You better build with wood!

**„Our promise is also a recommendation  
for the future and for the habitat of the  
generations to come: You better  
build with wood.“**

**Gerald Schönthaler**  
CEO, Ober-Grafendorf location





Being a PEFC-certified company, Rubner Holzindustrie exclusively processes PEFC-certified round timber, which almost entirely is harvested from a radius of 80 - 100 km. The timber is obtained from the Austrian regions of Styria, Lower Austria and Burgenland.

# Rubner Holzindustrie. The sawmill for timber engineering works.

The companies roofed under the corporate structure of the Rubner Group completely cover the entire value chain – from round timber processing to finished construction. This is unique throughout Europe, and everything starts with Rubner Holzindustrie.

Rubner as a company name, is inseparably linked to sustainable timber processing and unites, under the roof of this family-operated group, numerous companies located in 18 sites and in 4 different countries. All these companies act in concert and pursue one single aim - to ensure optimum cooperation among the companies. Therefore, it is of utmost importance to make no compromise whatsoever at this first step of the process chain. Rubner Holzindustrie, Austria's largest, most up-to-date sawmill, planing mill and glued laminated timber factory processes up to 400,000 m<sup>3</sup> of round timber a year. The range of products comprises mechanically strength-classified glulam beam strips, solid construction timber, prismatic boards and – an entirely new product – regionally CO<sub>2</sub> neutral pellets. 40,000 m<sup>3</sup> of solid construction

timber and 274,000 m<sup>3</sup> of sawn timber are being annually produced. The produced material is then used in timber engineering projects all over the world. Rubner Holzindustrie is thus the leading expert company for solid construction timber in Europe.

## Unique value chain

Since the entire, and Europe-wide unique value chain is covered under the strong corporate roof of the Rubner Group, top quality and reliable availability of materials can be continuously guaranteed. The main advantage, which results from the fact that all services – from purchasing round timber, to production and transport of the finished timber elements – are provided by one single source, strengthens the market position of the companies that use the ma-



## „Increasing regional value added and environmentally sound handling of wood as natural resource are top priority issues when it comes to the preservation of habitats for future generations.“

**Albert Weissensteiner**  
CEO, Rubner Holzindustrie

terial for further processing. All work steps including, for example, material drying, project-specific production and preliminary mechanical sorting, up to just-in-time delivery, are coordinated with timber engineering teams so that implementation will always be executed to the benefit of the client. This concept not only proves to be efficient but also sustainable – and these are the core values pursued by Rubner Holzindustrie.

### Clean energy

At the Styria company site in Rohrbach an der Lafnitz all signs point towards sustainable energy production and energy consumption – not only for the company's own purposes but also for the region. In 2022, several significant upgrading and extension works have been implemented in order to use natural resources more efficiently. These works included, among others, a biomass heating plant, pellets from in-house production, a largely dimensioned photovoltaic plant and even improved electromobility both in the production areas and for staff members.

Energy – above all its efficient and environmentally sound use – is the main

issue. CEO Eng. Albert Weissensteiner, MBA, summarises: “100 % of the wood that we receive in the company is being processed. No material is wasted. Round timber bark, for example, is thermically used in our biomass heating plant and exhaust air generated by heating is repeatedly used in production processes.”

### In-house biomass heating plant

An important step towards the future has been made with the installation of an in-house and state-of-the-art biomass heating plant with 8 MW capacity and a pelleting plant for the production of 60,000 tons of pellets per year. In cooperation with the company Bioenergie Köflach, a concept has been developed, to use the exhaust air that is generated in the heating plant for the drying of the sawn timber. Every year the company generates a total of approximately 100,000 cubic meters of bark and this energy potential is now being used multiple times.

### Regionally CO<sub>2</sub>-neutral pellets

Every year the company produces approximately 200,000 cubic meters of sawdust, which used to be sold to

outside customers. “Our new concept, however, now provides to immediately store and process the sawdust where it is generated. From the sawmill, the sawdust is brought to the wet sawdust silo, then to the sawdust drying plant, and finally to the pelleting plant. The drying plant is largely supplied with low-temperature heat, which is obtained in the flue gas condensation process” explains Albert Weissensteiner. In doing so, we can sustainably and reasonably profit from in-plant's exhaust heat. The Styrian pellets are mainly produced for households and customers from the nearby region. “Our aim is to offer high-quality fuel to our customers, which even excels usual standards. And we can do even better. Since 80 % of the round timber that we process is harvested within a radius of only 80 km, our regional “Styrian pellets” even comply with quality requirements of CO<sub>2</sub>-neutral pellets.

### Highly efficient drying plants

We have also revised and optimised our drying plants in terms of energy consumption. The high-temperature heat (approximately 110 °C) that is required for the four drying channels and 18 drying chambers is



Since its foundation in 1978, the most state-of-the-art and largest sawmill, planing mill and glued laminated timber factory in Eastern Austria is strongly rooted in Rohrbach an der Lafnitz, a densely wooded region in Styria. The company has been for many years now Europe's leading expert for solid construction timber.



Round timber in sufficient quantities for further processing: the present forest inventory of the Republic of Austria, which considers the period comprised between 2016 – 2021 shows an increase rate in the catchment area of 9.1 solid cubic meters/ha versus a removal rate of 7.4 solid cubic meters/ha. Stock is thus sustainably increasing, and stability and vitality of forest areas are well-balanced.



Utmost supply reliability backed by an uninterrupted value chain under the strong corporate roof of the Rubner Group: purchasing round timber, sorting, cutting, precision planing, scanner quality control and all further production steps, such as, fabrication of mechanically strength-classified glulam beam strips – from one single source – to then secure further processing for timber engineering projects.



**Data and facts**

Founded in 1978, since 1996 part of the Rubner Group  
130 employees  
Annual timber cutting rate: 400,000 solid cubic meters of round timber  
Further processing: approximately 100,000 m<sup>3</sup> of mechanically strength-classified glulam beam strips and approximately 40,000 m<sup>3</sup> of glued laminated timber and solid construction timber  
Operating area: approximately 14 hectares  
Hall area: approximately 30,000 m<sup>2</sup>  
Annual turnover: approximately 80 million Euro  
100 % use of supplied round timber  
PEFC-certification

To further process fresh sawn mill, it is necessary to dry the material to a specific residual moisture degree. In the company's 4 drying channels and 18 drying chambers a total of approximately 274,000 m<sup>3</sup> of sawn timber are processed every year for further production.



Certified quality pellets are produced in Rubner's pelleting plant, the so-called "Styria pellets", which are being continuously controlled by outside partners. It has been proven that these pellets contain more heating value than many other products that are presently being sold on the market.

**Products**

Strength-classified, previously planed glulam beam strips  
Solid structural timber, Duo-/Trio-Balken  
Raw material for glulam beams  
Sawn timber, main- and side products  
Mill by-products  
Pellets

directly obtained from the new biomass heating plant. In addition, the warm exhaust air from ongoing operation processes is also used. This exhaust air is blown into the stored wood stacks waiting to enter the drying process. This leads to a considerable reduction of total energy input. Albert Weissensteiner emphasizes: "We are able to dry 100 % of our round timber by in-house means. In the future, we will only be delivering dried and fully processed timber with considerably lower weight, and this will lead to a considerable reduction of our entire goods traffic volume and thus our CO<sub>2</sub> emissions on the street."

A further advantage of these additional and enhanced drying capacities is that Rubner Holzindustrie is entirely self-sufficient and can clearly react more flexibly to requests and demands coming from further processing companies working under the Rubner corporate roof. The thus resulting increased supply reliability for timber elements is – under given circumstances – one of the most important and decisive success factors in the timber engineering sector.

**Energy self-sufficient**

To keep the company's CO<sub>2</sub>-balance as low as possible, the roof surfaces of the storage halls have been equipped with a largely dimensioned photovoltaic plant with a capacity of 2,4 MWp. This plant covers approximately 25 % of the company's electric energy demand, which almost exactly corresponds to the energy requirement of the drying plant. Albert Weissensteiner explains: "We are thus traceably able to operate the drying channels and drying chambers – the sectors with highest energy consumption within the process chain – in a self-sufficient manner."

**Practised electromobility**

There are already 5 electrically driven forklifts in operation to handle and transport the sawn timber. Our aim is to progressively implement electromobility devices to finally be able to move and handle the entire sawn timber by electrically driven vehicles. The heads of department with direct customer contact have been equipped with six electric cars. Moreover, employees have been given the possibility to easily purchase e-bikes

to be used both for job and private purposes.

**Easy handling**

Albert Weissensteiner believes that the company is well-positioned for the future: "We process one of the most valuable and precious raw materials of all and carry an important responsibility. It is after all up to us, to responsibly use our woods and to sustainably manage them. We act as partners with handshake quality, emphasizing the regional character of our company, acting quickly in an uncomplicated manner and planning precisely. For this reason, we have our overall CO<sub>2</sub> footprint evaluated by external experts. This is how we manage to bring transparency into our internal production processes and visibly share those areas where intelligent use of applied energy can be improved.



# Gold Medal in the Olympia Park

Four years after the foundation stone had been laid, the new Campus of the Technical University of Munich (TUM) in the Olympia Park has been officially inaugurated. Timber and glass dominate the overall appearance. However, the architectonically most outstanding feature of this project certainly is the more than 150 meters long and 18.3 meters protruding unsupported cantilevered timber roof – a literally Olympic performance in the field of timber engineering.



A building complex – unique throughout Europe – on a surface of more than 42,000 m<sup>2</sup>. The literally most outstanding element is the impressive 150 meters long cantilevered southern roof, with a protruding extension of 18.3 meters that rests on hinged supports.



The new Campus of the Technical University of Munich (TUM) in the Olympia Park is presently considered to be Europe's largest timber structure. Following the official inauguration of the BA2 construction phase and the launching of a new public tender, Rubner has once again been commissioned to execute construction phase BA3. Thus, the entire project will have been implemented by the timber engineering experts of Rubner. Design was executed by the architect Dietrich I Untertrifaller.

#### **80 % of the structure implemented as timber construction**

In line with the requirements set by the building owner, this new construction was required to be resource-friendly and energy-saving, not only in terms of building material but also in terms of building operation. For this reason, 80 % of the new campus were built by using timber as construction material.

"This building is an outstanding example, which demonstrates that timber not only is a construction material with long-standing tradition but that it is also a highly modern material. The Free State of Bavaria, which owns Europe's largest wood reserves per hectare, is therefore increasingly using timber for construction" explains Brigitta Brunner, head of department in the Bavarian construction ministry.

#### **Implementation during ongoing operation**

The architects convinced with the concept of a clearly structured building complex, mainly made of timber and glass – subdivided into two hall- and office clusters, which have been erected on the footprint of the existing 1972 constructions that were to be replaced.

"By emphasizing and sharing our passion for timber with its excellent technical and atmospheric properties, we have designed one of Europe's largest timber structures. Thanks to high prefabrication rates, this building has been implemented with utmost precision, during ongoing operation and in a very short construction period, and in addition, this building sets new ecological standards", says Prof. Architekt Dipl.-Ing. Much Untertrifaller.

On a gross floor area of approximately 42,000 m<sup>2</sup> and with a total useable area of approximately 19,000 m<sup>2</sup>, the building houses 14 sports halls, 15 soccer fields, 7 beach volleyball fields and 22 tennis courts, hockey- and golf courses, 12 lecture halls, 15 laboratories, one cafeteria and one library. During the next construction phase, some additional 300 offices and workshops will be built. The two construction phases will then have been implemented during ongoing operation.

#### **Timber engineering par excellence**

The new Campus of the Technical University of Munich in the Olympia Park displays the entire range of services that is presently available in modern timber engineering. Besides the entire roof construction, the sports halls and institutes are also built as timber structures.

This project uses manifold elements from the timber engineering "tool box": long-span glued laminated timber beams, timber-concrete composite slabs with cross laminated timber base, partly glued, prefabricated timber frame walls and ceiling elements. Integrated steel main beams, suspended from roof beams, which are made of glued beech LVL, are additional elements that have been used in this construction". Timber

constructions allow high prefabrication rates and thus secure very short assembly periods: the hall clusters scheduled during construction phase 2 were erected within a period of only two months.

#### **150 meters of cantilevered roof with 18 meters of protruding extension**

The architectonically most outstanding and characteristic feature of the project: The impressive, cantilevered timber roof, resting on hinged supports and with a cantilevered extension of 18.3 meters. The structure's supporting system is composed of 40 box-type elements. With its 150 meters in length, the structure spaciously roofs the 100-meter running track and the outside terrace. The roof elements with 28 meters in length, 3.75 meters in width, 1.6 meters in height and a weight of 19 tons each rest on only four points: on two pressure columns and two tension columns.

The cross girders, which are required over the entire element width in both support axes absorb the shear forces of the longitudinal girders and distribute the load every 3.75 meters on the hinged supports. The cross girders are evenly incorporated into the elements. The longitudinal girders are connected to the support cross girder of the outside support axes by butt joints and connected to support cross girders for the transmission of shear forces. The momentums of the cantilevered portion are transferred as tension and pressure components to the field area via the continuously-arranged LVL panels of the top and bottom chord.

The box-type elements, which had never been produced or installed before in these dimensions and with this protruding extension, required

perfect production conditions at Rubner's production site in Ober-Grafendorf, regardless of prevailing weather conditions. In the scope of detailed workshop design, all other trades were involved in the planning process and all details including logistics and transport were discussed and coordinated for the overall design. The main benefits achieved were perfect adherence to time- and process schedules, highest precision and quality, no improvising on construction site, maximum accident prevention and short assembly periods with economic benefits for the building owner.



More than 2,400 TUM and LMU students and some 17,000 sportsmen and -women from all Munich Universities and colleges profit every semester from these new installations on a surface of 34 hectares.



#### Data and facts

Construction phase BA2 (concluded and put into operation)

Completion: 2022

Client: Free State of Bavaria, State Construction Office Munich 2 (GER)

Architects: Dietrich I Untertrifaller, Bregenz (AT)

Structural engineering: merz kley partner, Dornbirn (AT)

Construction supervision: Ernst<sup>2</sup> Architekten, Stuttgart (GER)

Roof surface: 14,800 m<sup>2</sup>

Cantilevered roof: 4,183 m<sup>2</sup> as box-type element construction

Roof and ceiling elements: 11,690 m<sup>2</sup>, 1,167 units

Timber-concrete composite slabs: 610 m<sup>2</sup>

Wall elements: 7,427 m<sup>2</sup>, 587 units

Glued laminated timber elements: 1,037 m<sup>3</sup>, 776 units

Cross laminated timber elements: 332 m<sup>3</sup>

Steel: 61 t

Photos: Aldo Amoretti, David Matthiessen

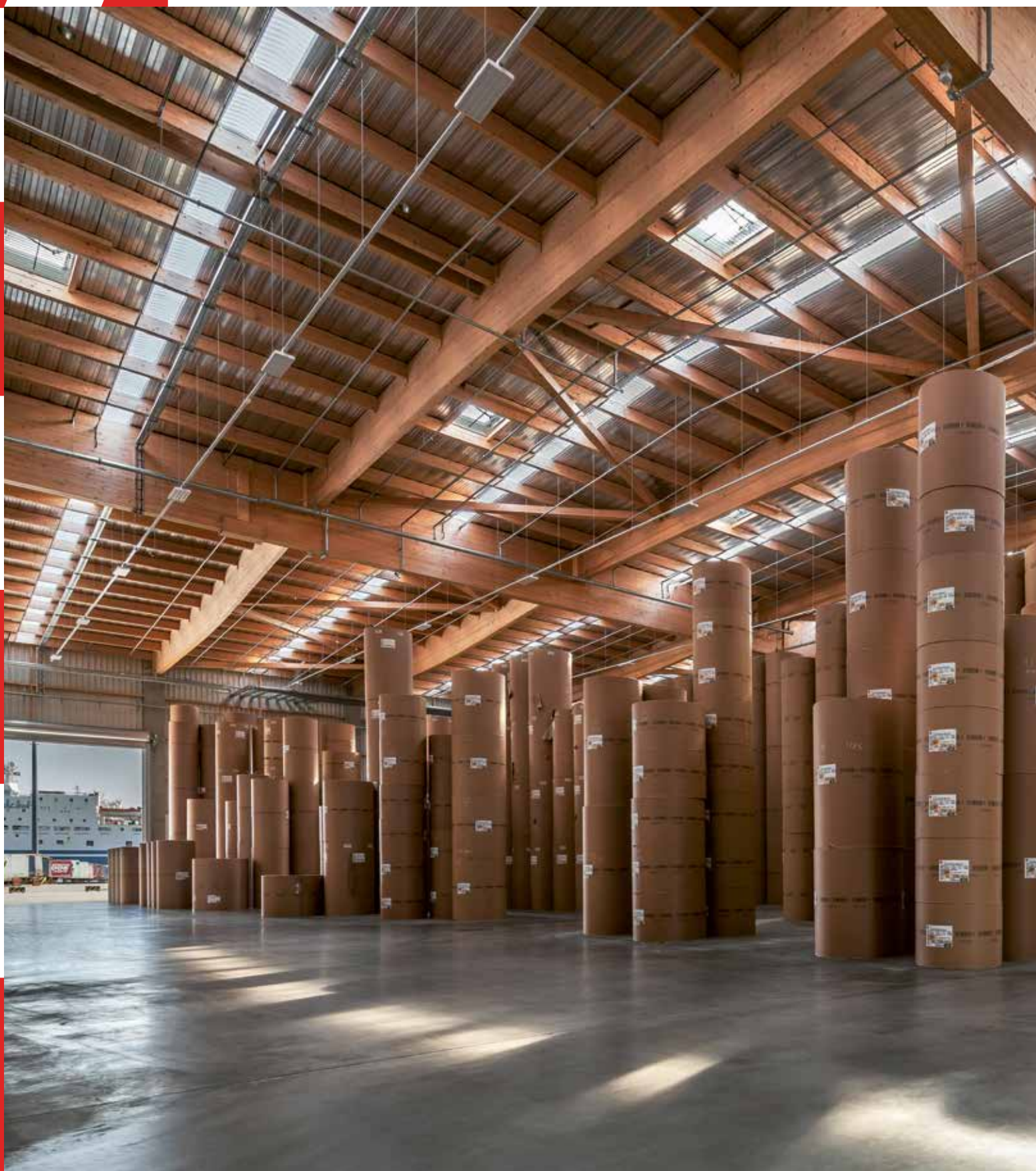
**„The earlier we, as timber engineering company, are involved to provide our engineering know-how, the more time will be saved in the implementation process. Rubner starts the cooperation process with building owners, architects, and other project parties as soon as possible.“**

**Andreas Fischer**  
CEO, Augsburg location



The supporting system of this anything but ordinary or simple construction is composed of 40 box-type elements, each of which having a length of 28 meters and a weight of 19 tons.





# Skandinavienkai. Logistics hall.

The implementation of the flexible and future-oriented logistics halls required specific know-how, which Rubner was able to provide thanks to numerous international, and similarly sized projects that the company has already implemented.

## European maritime hub

The port of Lübeck is one of Europe's most important ports but also the largest distribution centre for Scandinavian paper industry. To provide for additional storage capacities at the Skandinavienkai, which – with a total surface of 749,000 m<sup>2</sup> already today is the largest terminal – a new hall has been built with a roof surface of approximately 12,000 m<sup>2</sup> (121 x 101 meters) for the intermediate storage of paper. The general contractor for the Lübeck Hafen-Gesellschaft (the port operating company) was the German construction company August Prien. Project design works have been executed by the Lübeck based architectural office peter + jan gröpper Architektur- und Planungs-GmbH. Rubner was responsible for the structural engineering of timber constructions, workshop design, production, transport, and assembly.

The hall has been designed in a way to allow further extension if required. A total surface of 15,000 m<sup>2</sup> can be achieved and extension works can be implemented without having to

interrupt the halls' operation during construction works. Once again, timber constructions are the perfect solution for these type of project requirements since interfaces of timber constructions provide for the necessary flexibility to allow the integration of additional elements.

## Increased fire-protection specifications

Storing paper requires increased fire protection specifications. In addition to the specifically developed fire-extinguishing concept, timber offers natural and above all calculable fire-resistance properties. In the event of fire, the outside layer will carbonise thus decelerating the burning process or even preventing the fire from penetrating the entire timber structure. All structural requirements - enhanced and tightened in the course of time by official authorities - were fulfilled in the implementation of this project. All beam supports had to comply with fire protection standard R90, all fish-bellied girders and all ridged roof girders had to comply with fire protection standard R60.



**Challenging transport**

To build the supporting structure of the new logistics hall at the Lübeck port, Rubner prefabricated and processed a total of 1,425 m³ of glued laminated timber in its Ober Grafendorf factory. These huge material volumes require precise logistics and close coordination between production, transport, and assembly teams on-site.

Due to the dimensions of the fish-bellied girders measuring 43,5 and 28 meters in length, of the ridged roof girders measuring 27 meters in length, and due to element loads ranging between 12 and 22 tons per girder, road transport by truck was not feasible for economic reasons.

For this reason, the largely dimensioned elements with an overall volume of some 1,000 m³ were transported by ship from the Rhenu Donau port in Krems to the Lübeck port. Since the ship’s unloading point was located approximately 2 kms from the Skandinavienkai, the final transport section of the main girders to construction site was then made special trucks.

**Assembly in only six weeks**

The four beam supports were first assembled on site to reach an overall length of more than 60 meters and then lifted with the help of two mobile cranes onto the four columns provided. The fully assembled hall is composed of two glued laminated timber beams measuring 44 x 251 cm, each of them being composed of 4 elements with elements arranged over a length of 121 meters. The assembly of the 42 main girders, 6 beam supports, columns and wall beams only took six weeks, as previously scheduled.

**Strength of timber constructions**

For Anton Wanas, engineer, authorised representative and head of the international sales department at Rubner Ober-Grafendorf, the implementation of this new logistics hall in the Lübeck port is one additional evidence of the company’s service and performance strengths. And these strengths provide benefits to the client. “These types of large-scale projects are always challenging – not only in terms of production but also in terms of transport to destina-

tion sites. In this case, we were lucky enough to be able to manage most of the transport route by ship thus saving time and costs for the transport of the longest and heaviest structure elements. The newly built hall makes full use of its strengths. Timber as construction material allows to implement impressive spans without losing valuable storage area by interrupting columns. Just as experienced in other large turnkey projects, the timber construction that has been selected for the logistics hall at the Skandinavienkai allows to further extend the building, if required, without having to interrupt the hall’s operation during extension works and with no additional structural requirements.

The 12,000 m² large hall can be extended in the future, if required, to a total surface of 15,000 m² without having to interrupt the hall’s operation.



The assembly of the 42 main girders, 6 beam supports, columns and wall beams took only six weeks, as previously scheduled.

**Data and facts**

Implementation period for timber engineering works: 06/2021-11/2021  
Client: Aug. Prien Bauunternehmung, Hamburg (GER)  
Architecture and structural engineering design peter + jan gröpper  
Architektur- und Planungs-GmbH, Lübeck (GER)  
Glued laminated timber: 1,425 m³  
Steel: 15 t  
Photos: Daniela Bunu

**„Timber as construction material allows to implement impressive spans without losing valuable storage area by interrupting columns.“**

**Anton Wanas**  
International Sales Department, Ober-Grafendorf location





# Green Oak. Straight precision.

Office rooms, restaurant, sky lounge, lobby, and underground car park: the building, located in Paris, has been erected as hybrid construction and uses Rubner's pioneering timber engineering services combined with concrete elements and a glass façade. Awards have been granted for using experimental techniques and for the environmental sustainability of the building, thus emphasizing the implementation quality of the overall concept.

The "Green Oak" project in Arcueil, in the south of Paris, is presently excelling itself. The eye-catching office building, which is composed of eight upper floors and five basement levels, and which provides a total usable area of 10,706 m<sup>2</sup> was designed by the architectural offices CALQ and Mootz & Pelé. Rubner was charged with the architectonically challenging timber construction, façade profiles, and trimming works. The building has been conceived as hybrid construction, making best use of the individual strengths of all materials applied. Green Oak is considered a reference project in terms of comfort of use and energy efficiency.

## Open – yet closed in itself

The construction volume has been designed in the form of an "H" thus framing two inner courtyards. The overall structure is therefore divided into two connected but at the same time independent areas of use in terms of function and design. The Eastern longitudinal side of the building extends along the Avenue Aristide Briand, and from the Western

longitudinal side of the building the eyes wander over the nearby small garden plots heading towards Paris. The entire building communicates with its immediate surroundings. While the first floor opens-up towards the inside part of the building – the two storeyed entrance hall – the remaining floors provide access to terraces and loggias, which – when seen from the outside – set distinctive structural accents in the façade arrangement.

## Natural daylight

The alignment and arrangement of the structure guarantee maximum use of natural daylight inside the rooms. Approximately 85 % of the total usable area is reached by natural daylight. Even the plants on the green terraces profit from intense sun radiation. These open spaces, which have been very consciously conceived as "oasis of freshness" form open visual axes from one building side to the other. Visible timber elements in the community areas provide a feeling of natural warmth and perceptible cosiness.

## Intelligent material mix

The overall concept of the building is based on an intelligent mix of architectonically complementary materials: concrete cores, concrete ceilings and pillars are framed by a glued laminated timber façade construction. Rubner's post-and-beam construction has been designed in spruce towards the inside and in Douglas fir towards the outside. This timber structure serves two functions: on the one hand it has a stiffening effect on the entire building structure, and on the other hand it has a load-bearing function to the mineral façade cladding. The fact that timber – being a natural building material – has been very consciously used not only for construction but also for design reasons clearly underlines that Green Oak is an environmentally conscious model project of French construction industry.

## Innovative façades

The entire building is wrapped by a façade made of slightly glittering, nacre-coloured white glass panels





(expanded glass granulate StoVentec by STO) – an innovative type of rear-ventilated façades assembled on supporting timber profiles. The arrangement of the glass panels shows precise and harmonic joints, which not only meet aesthetical demands but also fulfil technical requirements. One technical challenge Rubner had to cope with was to synchronise the deformation of the façade cladding within the permissible range of 1 mm with the ones of the supporting timber structure and the concrete.

#### Logistical challenges

Moreover, Rubner's timber engineering team also had to precisely master all logistical challenges on site. Since it was not possible to intermediately store the material on-site, the timber elements that had been prefabricated in the factory were delivered to the construction site just-in-time. To avoid damages caused by rain during transport or damages caused by other trades on the construction site or by other construction elements during erection works with the crane,

Rubner developed a customised protection system. Each of the 700 visible (and therefore visually highly sensitive) timber beams were covered in the factory by rainproof sheets and waterproof honeycomb panels to be then safely delivered and installed on site.

#### Awards and certificates

Green Oak stands for particularly intense use of timber - the most natural construction materials of all. A total of 155 m<sup>3</sup> of timber have been used for the load-bearing and concrete stiffening post-and-beam structure made of European spruce and Douglas fir. Moreover, the external façade profiles are composed of some 210 m<sup>3</sup> of European pine. The intelligent use of this naturally renewable raw material has led to the Green Oak Project being granted several awards: HQE Certification "Outstanding" in the category commercial construction. BREEAM-Certification "Excellent", Well Core & Shell Silver, E+C-Certification Level E2C1, Biosourced Building Level 2, Effinergie+ and Wired-Score Certification "Platinum".

#### Data and facts

Completion: 2021  
Investor: Mata Capital, Paris (FR)  
Building owner: Kaufman & Broad, Nanterre (FR)  
General contractor: Eiffage Construction, Vélizy-Villacoublay (FR)  
Architects: CALQ, Mootz & Pelé, Paris (FR)  
Structural engineering: KHEPHREN Ingenierie, Arcueil (FR)  
Total usable surface: 10,760 m<sup>2</sup>  
Post-and-beam construction: 155 m<sup>3</sup>  
Façade profiles: 208 m<sup>3</sup>  
Photos: Schnepf – Renou



# Stadium as timber construction.

The Eric-Tweedale-Stadium in Granville near Sydney is Australia's first stadium where glued laminated timber has been used instead of steel and concrete and this did not go unnoticed, for sure. The stadium has been granted the Australian Master Builder Association Award 2022 in the category Sporting Facilities.





**„Safe and well-tested structural timber solutions complying with all regulations and standards have long since reached the sector of large volume, high-rise buildings – and now these timber constructions have also reached the sporting facilities sector.”**

**Raffaele Di Domenico**  
Sales Manager, Brixen location

Climate protection is of utmost importance and forces all of us to act consistently to preserve and improve our habitats and environment. Stadiums implemented as timber constructions score with extremely low environmental impacts, they reduce greenhouse emissions and energy consumption, and due to their reduced construction weight, they are particularly suited for those regions of major seismic risks. Numerous municipalities and associations all over the world, which implement FIFA sustainability strategy and support climate activists, rely on this construction material, which, in addition, is the only renewable building material. Thus, the Westhills Stadium in Langford, British Columbia, Canada was the first football stadium that has been entirely built of glued laminated timber. Developed, fabricated, and assembled by Rubner.

**Ecological design as major guideline**

Sustainable design and ecological implementation – these were the major guidelines and requirements of the Cumberland City Council to which the concept of the architects dwp (design worldwide partnership) had to

adhere – and the timber structure was the key to success: to demonstrate that a building of this size can be built as highly sustainable building, highly energy-efficient and with a very low carbon footprint.

**In harmony with the region**

The architectonic concept of the Eric-Tweedale-stadium is based on the idea of harmoniously integrating and embedding the stadium into the immediate surroundings and into the history of Cumberland Plain Woodlands, a unique natural environment in the Sydney Basin Bioregion. The stadium, located at the western side of the Granville Park, is surrounded in the east by a rugby field and in the west by old and colourful red and grey eucalyptus trees, which separate the stadium from the parking area and the street. Multi-purpose event rooms and common facilities characterised by an open and inviting atmosphere open towards the viewing platform at the south-eastern corner of the building. The stand has been dimensioned to receive 750 spectators and encloses, among other facilities, locker rooms, administration, and first-aid areas as well as a large canteen kitchen.

**Climate protection is the major issue**

The glued laminated timber roof protrudes more than 8 meters beyond the seats of the stand. With its simple, yet impressive design, the roof creates a clear historic reference to the forest, which used to dominate the area in former times. Besides the largely reduced carbon footprint – which is achieved by its timber structure – the stadium is aligned in an east-west axis, which provides for natural cross ventilation. The cantilevered roof sections serve as protection against sun radiation and rain. The state-of-the-art photovoltaic plant on the entire stadium’s roof surface produces large amounts of the electric current that is consumed by the sporting facility. A huge rainwater tank secures water for the irrigation of the rugby field, for surrounding green areas, and toilet water. With a total amount of 130 tons of carbon dioxide that are saved by this timber construction, the stadium actively contributes to climate protection.



The new, highly modern Eric-Tweedale-Stadium with seats for 750 visitors is home to the first-class rugby team “Two Blues”, and training facility to the A-League Macarthur Football Club. Moreover, the stadium is used for community- and other events.

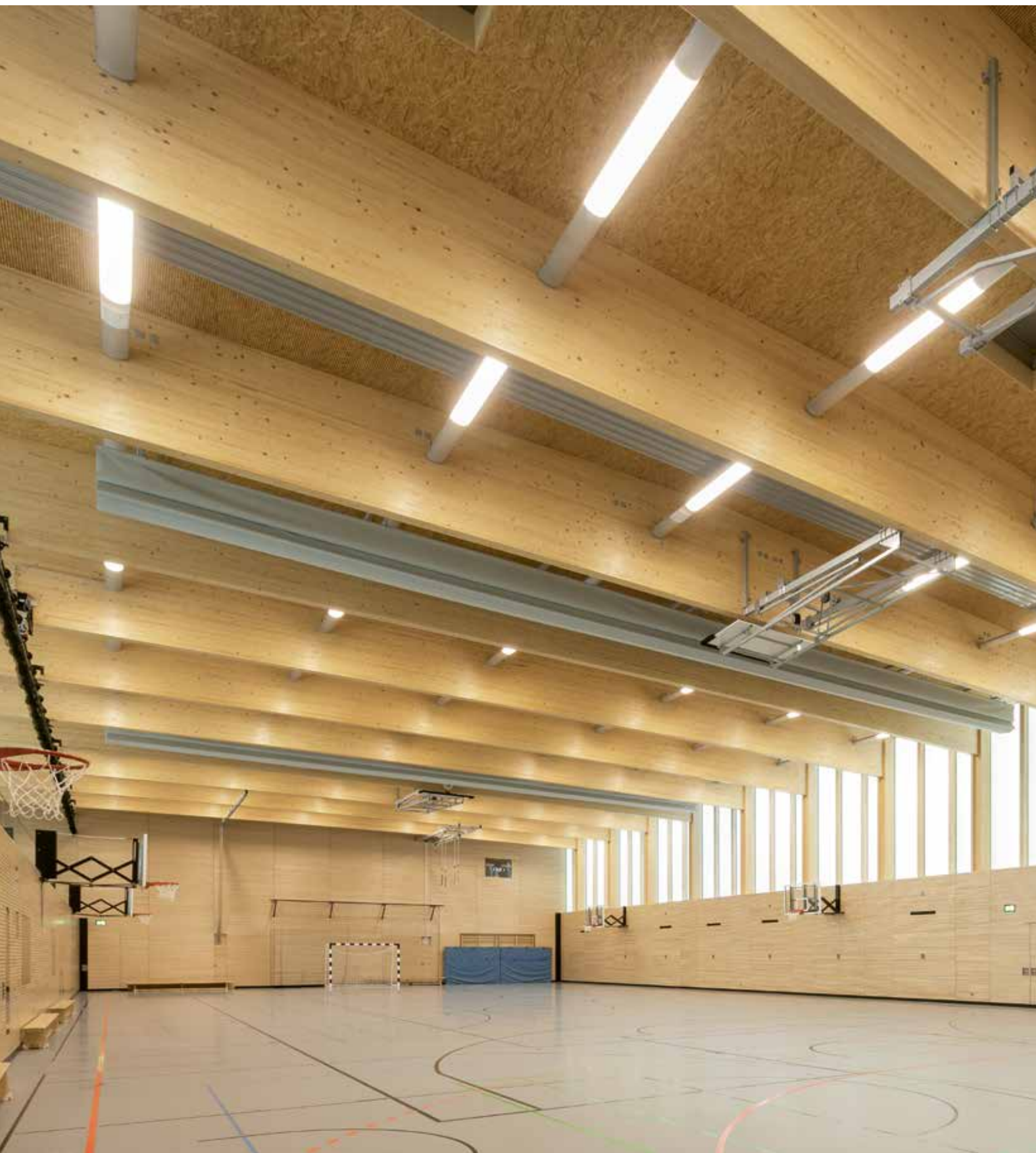
**Data and facts**

Completion: 2021  
Building owner: Cumberland City Council (AUS)  
General contractor: Belmadar, Naremburn (AUS)  
Architects: dwp, Sydney (AUS)  
Structural engineering: Northrop Consulting Engineers, Sydney (AUS)  
Glued laminated timber: 185 m³  
Photos: Brett Boardman Photography



The sporting facility has been named after the Australian rugby player Eric Tweedale. On the occasion of his 100<sup>th</sup> anniversary in the year 2021, the sporting facility, which used to bear the name of Granville Park Stadium was renamed into Eric Tweedale Stadium.





# Sporty types for Berlin.

Timber engineering allows the implementation of the most eye-catching and visionary buildings and structures. In addition, timber structures can display their full strengths when it comes to the implementation of standardised objects and serially erected constructions.

The Berlin Energiewende law, i.e. the law which stands for Germany's on-going transition from fossil energy sources to renewable energy sources, emphasizes the public's sector leading role in the field of climate protection. Berlin has set itself the goal to become climate neutral by the year 2045. Therefore, the decision to plan the sports halls as timber constructions and to opt for serial design was both logical and consistent. Being a natural construction material, timber allows to build structures of almost any size in a relatively short period of time adhering, at the same time, to cost efficiency and environmental sustainability. Timber is a light-weighted yet stable material, renewable, heat-insulating, and more calculable in terms of fire behaviour compared to other building materials. In addition, and this acoustic property is crucial for the use of timber in sporting facilities, the material is sound absorbing.

## Nine triple-purpose sports halls

The Berlin Senate Government profited from these benefits by installing nine triple-purpose sports halls. Seven of these sports halls can accommo-

date 60 spectators each and the other two sports halls can even accommodate 199 spectators each. Rubner was responsible for the structural implementation of the timber engineering concept of these standardised type-sports halls – one basic concept that can be quickly adapted and modified to nine different school sites.

## General contractor

The architects' association scholl. balbach.walker has been responsible for design and planning activities and Rubner has implemented the project with Gustav Eppele as general contractor. In accordance with the Senate Government guidelines, DGI Bauwerk was charged with project management and supervised the entire planning cycle of the general planner and implementation works of the general contractor.

## Standardised type construction

The special feature about this project is the standardised type-construction: a modular construction with standardised glued laminated timber structure, which – with only minimum effort – can

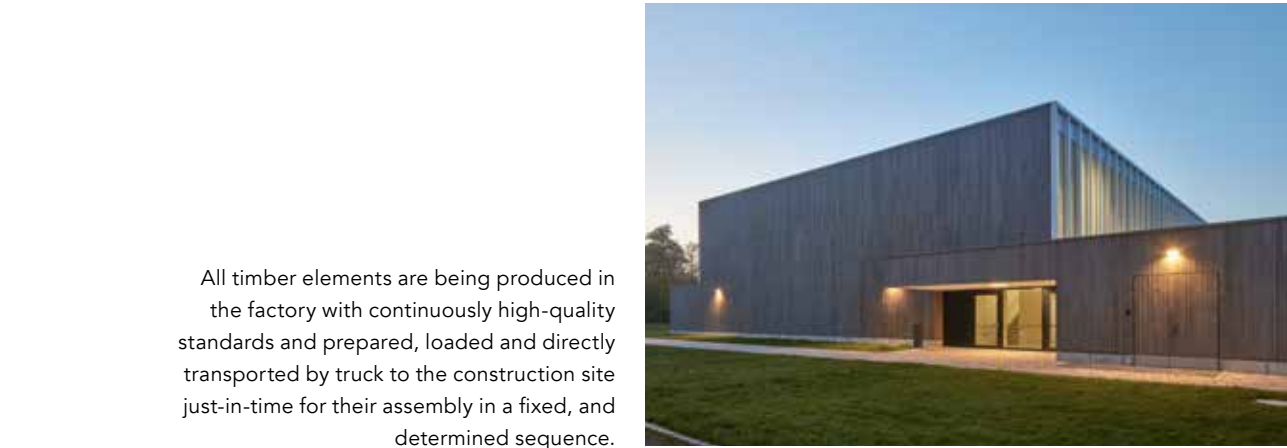


**Data (all halls) and facts**

Completion: 2022  
Building owner: Senatsverwaltung für Bildung, Jugend und Familie, Berlin  
Senate Government for Education, Youth and Family, Berlin (GER)  
Architects: scholl architekten partnerschaft scholl.balbach.walker, Stuttgart (GER)  
Structural engineering: Helber + Ruff, Ludwigsburg (GER)  
Project management: DGI Bauwerk, Berlin (GER)  
General contractor: Gustav Eppe, Stuttgart (GER)  
Glued laminated timber: 1,060 m<sup>3</sup>  
Roof elements: 11,400 m<sup>2</sup>  
Wall elements: 8,500 m<sup>2</sup>  
Timber-glass-façades: 5,500 m<sup>2</sup>  
Photos: Hans Juergen Landes



This standardised type-construction is based on high factory prefabrication rates in Rubner production sites.



All timber elements are being produced in the factory with continuously high-quality standards and prepared, loaded and directly transported by truck to the construction site just-in-time for their assembly in a fixed, and determined sequence.



be easily adapted to different urban planning situations and different site layouts. The three-pitch sports halls with accommodations ranging from 60 to 199 visitors and a useable area of 1,640 m<sup>2</sup> are all based on one and the same design concept with three purpose areas (hall, equipment rooms, and ancillary rooms) and planned with almost identical constructions. This standardised one-type repetition in fabrication-, handling and construction processes saves both financial and time resources.

**Dimensions**

Dimensions of these nine standardised type sports halls in Berlin are quite impressive. Each hall measures

in its inside (clear inner dimension including safety clearance) 22 x 45 meters, so that the playing fields can be subdivided by means of double layer dividing curtains into three units, each unit measuring 22 x 15 meters. The halls' clearance (for sports purpose useable height) is 7 meters. Each hall has a useable surface of approximately 1,640 m<sup>2</sup>. Span widths are the most challenging structural elements in the construction of similarly sized sports halls since no supporting columns whatsoever can be installed on the playing fields. In the halls, which accommodate 60 visitors' seats, maximum spans reach to approximately 26 meters, and in the halls, which accommodate 199 visitors' seats, maximum spans even reach to almost 34 meters.

**Tight schedules**

Standardisation, factory prefabrication and serial processes allow to keep construction work execution processes on site as short as possible and to even beat previously set schedules. This is an important factor since school- and club sport sectors are characterised by very narrow time slots where construction works can be executed – mostly during summer holidays in order not to disturb school operation. Rubner managed to implement these standardised type sports halls within a period of approximately eleven weeks per hall – including assembly and installation of the timber structure, wall and roof elements as well as assembly of the timber-glass-façade.

**„Compared to solid construction elements, timber elements are delivered to construction sites with ready-to-install surfaces and do not require any on-site post-processing whatsoever.“**

**Michael Walker**  
scholl architekten partnerschaft scholl.balbach.walker





# Roots. Growth according to schedule.

Prefabrication in new dimensions: every three weeks, a new storey is added to Germany's highest timber building "Roots" in Hamburg.

The fact that this project has up to now been executed in a well-organised manner with no delays at all is basically due to Rubner's factory prefabrication concept. Reaching new dimensions and complexity rates, this concept is part of a more cost-efficient project implementation thus providing numerous benefits: production processes that can be executed regardless of prevailing weather conditions, reliable time- and process schedules, on-site delivery of pre-assembled construction elements just-in-time, high processing quality and cost transparency. "These benefits are complemented by the fact that on-site construction periods are considerably reduced by high prefabrication rates of timber elements", adds Andreas Fischer, CEO of Rubner Augsburg. Factory prefabrication of the structurally load-bearing timber

frame outside walls is one of the most complex and challenging steps in the implementation of the Roots project. The elements, which measure up to 14 meters in length and 3.2 meters in height, some of them weighing more than 6 tons, are not only prefabricated as linear but also as three-dimensional elements. Each of this prefabricated element is composed of several individual elements. The completed construction element including the recessed loggia not only forms the outside wall of the timber high-rise building but also assumes load-bearing functions of the supporting structure. Completion of this outstanding Hamburg timber building is scheduled for the year 2024. Architects in charge are Störmer Murphy and Partners, the structural engineering part is executed by Assmann Beraten + Planen.





# Under construction and completed.



Rubner is glad and proud to have been awarded the project for the building shells of the residential units Birkenstraße that are erected in Penzberg. The four-laned installation in hybrid construction is composed of seven building structures and has been designed complying with KfW 55-Standard. Situated on the hillside with a view towards the Alps, a total of 149 apartments are built in the car-free district on a total floor area of 24,000 m².

On a total surface of approximately 20,000 m², the resource park Graz provides for the collection, sorting, and recycling of more than 80 different waste types. For the roof construction, which is made of timber and comprises a photovoltaic plant, Rubner uses 4,068 m² of pre-fabricated roof elements and 666 m³ of glued laminated timber.



The structure of the new primary school in Borgo Valsugana with architectonically outstanding façade and high energy efficiency rates will be fully made of timber. A total of 1,310 m³ of cross laminated timber (XLAM) will be processed for walls and ceilings and approximately 130 m³ of glued laminated timber will be used for roof construction.

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