

WOOD CULTURE 21

CONSTRUCTION EXPERTISE FOR ARCHITECTS, DESIGNERS AND BUILDING OWNERS



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EDITORIAL

21ST CENTURY

CONSTRUCTION MATERIAL



Wood is a smart material, and the recent trend is the perfect evidence for it, since this natural building material is increasingly being used for the construction of future-oriented business clusters, innovative research centres and university facilities.

This magazine contains selected testimonials where wood has been purposefully used as prime choice building material due to its unique material properties. In the ZELUBA® project that has been executed in Braunschweig, the building contractor had clear specifications - all modern building materials should be used according to their constructional strengths and properties. This project perfectly combines theory and practice of structural

engineering. On the premises of the former tobacco factory, Manifattura Tabacchi, in Rovereto, this natural material scores thanks to the time advantage that is achieved by factory prefabrication of construction elements required for the eight new buildings that have been built for the industrial innovation centre. On the RTE Campus in Lyon, a training centre including institutes for research and development activities, as many construction materials as possible are being used from renewable resources to secure perfect interaction between buildings and surrounding eco-systems.

For us, the Rubner company, building with timber as construction material has always been more than a trend.

Since 1926 it has been part of our philosophy - deeply embedded in our family-operated company - and expression of our passion to work with one of the most natural building materials of all. Wood - as construction material - creates an atmosphere that not only secures utmost housing quality but also perfect qualities for working and living environments, and that is the reason why we consider wood to be the construction material of the 21st century – and, of course, even far beyond this 21st century!

Yours truly

Peter Rubner
Peter Rubner

President of the Rubner Group

RESIDENTIAL HOUSING ALPENLAND

HOME FIELD ADVANTAGE

The non-profit building, residential, and housing estate cooperative Alpenland has established special requirements in the tendering procedure for a new residential housing project in Ober-Grafendorf: timber engineering companies and architects had to submit their proposals as one team. The timber engineering company Rubner Holzbau and architects from MAGK Architekten Aichholzer I Klein convinced the jury with their flexible concept. For the first time, Rubner Holzbau has assumed the role of general contractor in association with STRABAG, a construction service providing company.

Modern timber engineering methods offer all necessary requirements to implement multi-storey, large-sized residential projects, both in terms of ecological aspects and economic efficiency. The non-profit building, residential, and housing estate cooperative Alpenland wanted to take practical advantage of these benefits. Therefore, the non-profit cooperative not only searched for a detailed implementation design for this specific project in Ober-Grafendorf in the scope of this call for tender, but also wanted to identify a building structure typology and a special building system, which - by simple adjustments - could also be successfully implemented in other locations. Five teams, each of them composed of an experienced timber engineering company and one architectural office, were invited to submit their proposals. In the end, Rubner Holzbau and MAGK Architekten Aichholzer I Klein were the ones to be awarded

the contract. For Roman Fritz, CEO of Rubner Holzbau, this project is a home field advantage in numerous respects: "We operate on familiar territory since our production facilities in Ober-Grafendorf are only some few streets away from the planned location of this new residential project. Together with architects from MAGK and the STRABAG company, our construction service providing partner in the company association, we were able to fully concentrate on the scalability of plans. Since we complied with all the set requirements, it was almost a matter of honour to win this tender procedure."

Specifications formulated by Alpenland were clear: a total of 80 two- to three room apartments with living spaces ranging from 55 to 72 m² in up to five identical three to four-storeyed building structures were to be built on the former premises of the Glöckel carpentry company. An additional requirement was to execute the

buildings as timber or timber hybrid structures in modular construction with high prefabrication rates. Timber engineering companies and architects had to submit one common binding offer as general contractor proposal.

The concept of the winning project submitted by MAGK architects and Rubner Holzbau is based on a variable L-shaped central access and utility building core (central staircase with walls, ceilings, and flight of stairs) made of prefabricated concrete elements and timber housing modules arranged around this building core. Four detached, four-storey point block buildings, with almost square-shaped floor plans that are arranged in a slightly offset manner have been planned for the Ober-Grafendorf project. Load-bearing outside walls of the buildings and floor slabs are composed of cross laminated timber panels (CLT), whereas load-bearing apartment separating walls are



implemented as timber frame constructions. Outside wall elements of the four almost identical building structures – with dimensions 23 x 27 x 12 m – are factory prefabricated, including heat insulation, rear-ventilated façade made of artificially aged larch battens, and ready installed windows. It was a very conscious decision to refrain from loggias. Instead of loggias, buildings have been provided with pre-set balconies made of CLT panels on steel supports, and the balcony construction is implemented as fully recyclable structure by means of reversible fastening points and connections.

Roman Fritz is fully convinced of the timber engineering concept that has been submitted by Rubner Holzbau: "This tender procedure shows how important it is to integrate timber engineering companies into planning activities at a very early project stage. Our system works perfectly well in Ober-Grafendorf but can also be

applied to other building lots. We have taken an important step towards cost efficiency in the timber construction sector, and specially, in the field of multi-storey apartment buildings and have thus managed to increase the attractiveness of this kind of constructions for institutional clients."

Completion: scheduled for 2023

Client: Cooperative Alpenland Gemeinnützige Bau-, Wohn- u. Siedlungsgenossenschaft reg. Gen.m.b.H, St. Pölten (AT)

General contractor: Company association composed of WHA Ober-Grafendorf RUBNER-STRABAG, St. Pölten (AT)

Architects: MAGK Architekten Aichholzer I Klein, Vienna (AT)

Structural engineering: DI Dr.techn Wolfgang Billensteiner, Markersdorf (AT); Kalczyk & Kreihansel, Rohrbach/Gölsen (AT)

Timber construction: Rubner Holzbau Ober-Grafendorf (AT)

Living area: 5,328 m²

Façade elements: approx. 4,070 m²

Glued laminated timber: approx. 40 m³ for several construction elements, such as beams, pergolas, garbage rooms and carports

Cross laminated timber: approx. 1,490 m³, in visible quality

Visualisations: MAGK ARCHITEKTEN, schreinerkastler.at



SEVEN OF THE TWENTY

HYBRID CONSTRUCTION

Europe's metropolitan cities are growing, and Berlin is no exception as the demand for new and affordable living space continuously increases. On the former premises of Berlin Chemie, at the edge of the Johannisthal landscape park, the housing association HOWOGE Wohnungsbaugesellschaft mbh has built a car-free neighbourhood including 314 apartments, commercial areas, one large child day care centre and car park with 123 parking lots for electric vehicles and other vehicles. Seven of the twenty detached houses have been implemented as timber hybrid construction.

The influx to the German capital of Berlin is a continuous and unbroken trend. More and more people, among them young families, are attracted by this vibrant and buzzing metropolis. This explains the constantly rising demand for affordable living space, which, at the same time, shall offer adequate and high living quality. Due to its geographic location and the recent historical development, the city still has spacious areas to offer, which allow further growth. This also applies to the 2.6 hectares large estate located at the Straße am Flugplatz in Berlin-Johannisthal, where HOWOGE Wohnungsbaugesellschaft, one of the six existing Berlin's housing associations, is installing a new neighbourhood.

The "Johannisgärten" neighbourhood includes 314 apartments out of which 156 apartments, pursuant to the cooperation agreement concluded with the Land of Berlin, will be rented as state-subsidized living space. The rest of the apartments will be offered for an average price of less than 10 Euros per sqm. These are perfect conditions for the employees (and their families) working in the nearby science and technology park Adlershof. The urban concept

of the "Johannisgärten" is based on openness and communication. The 20 detached buildings form a building structure around five spaciouly dimensioned patios, which are interlinked by shared spaces, such as foot and cycle paths and neighbourhood plazas. In addition, the area includes several play areas, shared communal and commercial areas, one large child day care centre for 25 children, one DHL-parcel collection station and one central car park with 123 vehicle parking lots including 40 charging stations for electric vehicles. "With the Johannisgärten we have implemented our most demanding construction project of all. Starting with the building materials that have been used in this project up to the owner-to-tenant electricity supply concept, the mobility concept and finally the rainwater management concept, this neighbourhood significantly contributes to the achievement of climate targets set by the Land of Berlin", explains Ulrich Schiller, CEO of HOWOGE building association. The most state-of-the art heating, ventilation and air conditioning technology provides for room and water heating in the apartments.

Integrating and using wood - a natural building material - perfectly fits into

the global concept of this new neighbourhood. The architects of roedig.schop architekten PartGmbB explain the concept more in detail: "We have used two different systems for the building envelope, which, in terms of construction, are reasonably assigned to the different buildings' storeys. For the four-storeyed buildings, we have opted for prefabricated non-bearing highly insulated timber frame elements with rear-ventilated spruce façade with a total wall thickness of 40 cm. We were therefore able to fully meet the very strict requirements in terms of thermal insulation and to implement maximum living space. The ensemble formed by the required fire-proof bulkheads and the window formats provide the façade's characteristic design details. Prefabrication of timber construction elements allows rapid and precise building implementation right from the early planning stage, securing, at the same time, high creative and architectural benefits".

According to Andreas Fischer, CEO of Rubner Holzbau, the housing association HOWOGE – acting in its capacity as contracting party – gives an important stimulus to urban development with the implementation of this project: "More than one third



of the new buildings have been implemented with a timber envelope. This is a path-breaking decision since building with timber provides extremely rapid, precise, and stable results. In addition, the use of timber guarantees good energy standards and a pleasant indoor climate within the apartments. The implementation of this project in the "Johannisgärten" is a perfect reference project to prove the ecologically and economically reasonable benefits that are obtained by these new timber constructions installed in urban environments." Having proven to be an experienced and reliable partner in the multi-storeyed timber and hybrid construction sector, Rubner Holzbau has equipped six of the four-storeyed buildings (of building class 4) with building envelopes made of prefabricated wall elements. The seventh building, a three-storeyed special-purpose building, which houses the

child day care centre on the ground floor, was implemented as a combination of eco-friendly timber-hybrid and massive construction.

A total of 6,650 m² of outside wall elements were planned and prefabricated in the Rubner factory in Ober-Grafendorf for these new residential structures built in the Berlin-Johannisthal neighbourhood. Prefabrication rates in this project are very high since individual elements were already factory-equipped with integrated windows and sun protection devices, so that once the elements had been delivered, on-site assembly was quickly concluded with the help of cranes. "Positioning the individual elements in between the non-bearing floor slabs certainly was a challenging constructional step on-site. We were able to precisely position the wall elements by using lifting devices, a lifting beam,

and to rapidly fasten the elements. Therefore, we could refrain from using scaffolds," summarises Andreas Fischer the execution of on-site works. Cladding is made of rough-sawn and pre-patinated spruce wood and completes the exterior wall with intelligent details for heat-, sound- and fire-proof building comfort.

The fact that rental properties, in general, and partly subsidised living spaces, in particular, can fulfil sustainability criteria in the construction process is proven by the fact that more than one third of the detached buildings have been built by using timber - a renewable resource - for the building envelope. In addition to that, the project "Johannisgärten" scores with some more sustainable technical details that will stand out positively in daily living. Six buildings have been equipped with a photovoltaic plant, which produces

both affordable and CO₂-free owner-to-tenant electricity. These electricity prices are considerably cheaper than comparable market rates and thus contribute to secure affordable rent charges. Decentralised units in the apartments provide for room and water heating. Sustainable CO₂-saving results from low system temperatures since water is not, as usually, centrally heated to 60 degrees Celsius, but only heated on demand in the individual apartments to a temperature of only 45 degrees Celsius. Energy savings achieved by this method may amount to even 30 % compared to conventional heating methods. Moreover, this new neighbourhood has been labelled to comply with KfW low-energy house standards 55.


Andreas Fischer draws a positive conclusion for Rubner Holzbau: "As contracting party, HOWOGE Wohnungs-

baugesellschaft, has recognised the signs of the times and has taken the decisive step towards implementation of timber constructions. This confirms that ecological awareness and economic benefits are not contradicting features but rather support one another on the long run. High factory prefabrication rates, one of the outstanding and strong features of timber constructions, pay off in the process of project planning, implementation, and final assembly. As a result, we obtain living spaces that not only fulfil today's standards but also comply with future requirements." To underline the company's commitment towards this embodied timber passion, Rubner Holzbau has assumed a tree sponsorship for a group of small-crowned, little-leaf limes (*Tilia cordata* Rancho).



Completion: 2021
 Client: HOWOGE Wohnungsbaugesellschaft, Berlin (GER)
 Architects: roedig . schop architekten PartG mbB, Berlin (GER)
 Structural engineering: ITP Ing.ges für Tragwerksplanung, Berlin (GER)
 Timber engineering: Rubner Holzbau Augsburg (GER)
 Massive construction: B&O Gebäudetechnik GmbH & Co KG, Berlin (GER)
 Façade elements: approx. 6,647 m² of prefabricated spruce façade elements,
 windows and sun protection devices integrated into the elements
 Photos: HOWOGE Berlin/Stefan Müller Berlin; Andreas Muhs, Berlin





APARTHOTEL THE BASE TOP LEVEL SWISS HOSPITALITY

The newly built aparthotel "The Base" is located in the Swiss town of Andermatt at a height of 1,450 above sea level. With its ten luxuriously equipped suites and rooms, "The Base" offers Swiss hospitality at the highest level - not only during the winter months but also in the summer season. The fact that this exclusive hotel project has been implemented as timber construction in cooperation with the Rubner Holzbau company has several good reasons - even construction-based reasons.



Andermatt is a very special place and one of the most popular holiday destinations in Switzerland. The village is centrally located but at the same time secluded from massified agglomerations. The Ursen Valley is surrounded by eight alpine passes and its adjacent mountain peaks and side valleys, including mountain lakes and hiking trails, guarantee unique adventures - both during the summer and winter season. Goethe, at his time, is supposed to have made the following remark on Andermatt: "Among all the regions that I know, Andermatt is the dearest and most interesting to me".

From now on, this region will have one additional construction to exhibit since this new aparthotel called "The Base" is considered an exceptional reference project, in terms of touristic and

structural aspects. A reference project implemented by Rubner Holzbau in Bressanone. The location of "The Base" more than merely fulfils the expectations that arise by the name of the hotel since it is located only 50 metres away from the next lift and the railway station.

"Therefore, this exclusive hotel concept literally meets all the requirements of a base camp that guarantees successful leisure activities, holidays and vacations", summarises Peter Rosatti, CEO of Rubner Holzbau. The contracting company Source Procurement SA owned an undeveloped plot in this holiday location with a gross surface of 500 m², out of which 220 m² have been used for the construction of the new hotel. The main objective was to make perfect use of the surface that had been dedicated to the hotel. The concrete-built base-

ment of the hotel serves as underground car park and at the same time as foundation for the 4.5 storey building, ground floor, 1st, 2nd, and 3rd floor as top floor and a separate technology floor. All load bearing outside walls and part of the inside walls of this new aparthotel directly rest on the 60 cm thick reinforced concrete ceiling of the basement. To make sure that timber walls are securely anchored, tie rods and shear keys were implemented in the concrete structure. Since the hotel basement is used as underground car park, the inside parking area was designed as open and spacious area with as few supporting columns as possible. Therefore, one of the building's structural specification and requirement was to keep the weight of the building as low as possible – one of the major reasons why Source Procurement SA opted for the implementation of a timber construction.



An additional reason that scored in favour of timber as construction material was the high factory prefabrication rate of wall-, ceiling-, and roof elements.

It was the declared aim to build the hotel in the shortest construction period possible during the summer season since otherwise construction works would have been most probably impeded and delayed by strong precipitations. Snowfalls until May and from October onwards are not unusual in the Andermatt region. An additional aspect that had to be considered in this project were confined space conditions on site. Not only

that the crane had to be installed on the property of a neighbouring chalet (which is also owned by Source Procurement SA), all factory prefabricated elements were lifted directly from the truck trailers and assembled on their final position. The truck trailers were exchanged right on the construction site and not loaded, which allowed to keep the narrow streets free for remaining road users and to minimise restrictions for residents.

As a matter of fact, Rubner Holzbau managed to implement the structural frame of the hotel during the months of June to September and to conclude the entire scope of services

by December 2020. Universal timber panels implemented in wooden frame construction were used as outside walls. The front-mounted, visible battens applied onto the outside walls to provide the building with its façade structure are factory pre-assembled. In addition, all elements are equipped with a 6 cm insulation layer and an 18 mm thick fibre-reinforced gypsum board layer provided as fire protection measure. The roller shutter boxes above the window openings integrated into the wall elements have also been pre-installed in the Bressanone factory of Rubner Holzbau. These elements secure required fire protection class EI30. The



Completion: 2020
Building owner: Source Procurement SA, Massagno (CH)
Architect: A++ Human Sustainable Architecture, Lugano (CH)
Timber engineering: Rubner Holzbau, Bressanone (IT)
Façade elements: approx. 750 m²
Roof elements: approx. 300 m²
Glued laminated timber: approx. 15 m³
Cross laminated timber (X-Lam): approx. 200 m³
Photos: a2plus - A++



building shell was implemented in conformity with applicable standards and regulations as airtight building.

All inside walls of the hotel building meet load-bearing and stiffening requirements. All apartment partition walls as well as staircase walls and lift walls have been implemented in cross laminated timber (X-Lam). These elements are made of five layers with thickness rates ranging from 12 to 14 cm. Static reinforcement is achieved by providing stable connections with the help of dowel pins, slotted steel plates, and prefabricated corner elements. The forces affecting the wall structure were analysed by experts based in the technical department of Rubner Holzbau in Bressanone by using detailed three-dimensional modelling. The project is characterised by a rather unusual structural feature. Both staircase and lift shaft are

implemented as timber construction, which, compared to otherwise usual construction types that are made in reinforced concrete, saves weight and construction time. However, this feature does call for the installation of fire protection encapsulation measures (K60) by providing a 18 mm thick fibre-reinforced gypsum board layer for all building elements.

The key figures of this eye-catching hotel project in the Swiss village of Andermatt are certainly something to be proud of. During the short construction period of only 4 months, which was required to install the structural frame of the building, a total of some 750 m² of prefabricated façade elements (with partly front-mounted battens), and approximately 300 m² of roof elements (with factory pre-installed roof windows) were used. Some 15 m³ of glued laminated

timber and 200 m³ of cross laminated timber were additionally used. Some 10 tons of steel elements and girders serve as connectors for timber elements and stabilise the entire building structure.

In many different respects the newly built aparthotel "The Base" is considered a path-breaking and pioneering reference project for Rubner Holzbau. "With the construction of this building, timber engineering industry has been able to fully play its strengths. The contracting party was well aware of this fact and has efficiently used the advantages provided by short construction periods and low timber material weight for its purposes", summarises Peter Rosatti. Since December 2020 guests are able to experience the outstanding housing and living quality in a solid timber building.



RTE CAMPUS

RESEARCH AND DEVELOPMENT

The RTE Campus in Jonage, located east of Lyon (FR), houses the training centre and all research and development institutions of RTE, the French power supply system operator. This project was initiated by the turnaround in energy policy and the constant development of power supply systems.

On a building space of more than 20,000 m², the implementation of this project is to be understood as synergetic networking to link the area to the innovation location Lyon (start-up-companies, clusters, FabLabs, etc.) with the aim to develop digital solutions that are necessary for the operation of future power networks (control technology, power electronics, IT systems, among others) and to experiment with them. The teams of AIA Life Designers have planned this construction project in accordance with the main project objective: to create not only an innovative and efficient location but also an inviting working and learning environment that encourages creativity and enhances well-being. At the same time, this project is meant to be a testimonial for sustainable development.

Two roofed outside paths were built as prolongation of the inside passage that takes its way all across the existing building. These outside paths connect the different buildings by following the form of a comb structure. The remaining building structures are arranged as single pavilions around this "architectural spine". This arrangement clearly indicates that architects have designed an extensible and developable construction plan, which allows for further adjustments of the Campus in case of modified

future requirements. To secure this type of flexible adjustments, office buildings were separated from technical facilities (which generate more noise), since individual sectors must comply with different requirements in terms of ceiling heights and raised floor heights but also in terms of acoustics and lighting systems.

The V-shaped structure of the Douglas fir timber frame pillars that was used for the roofed outside paths provides an exciting dynamism to the architectural concept and evokes the image of the sinusoidal shape of an alternating current wave. Building envelopes are made of a timber-concrete façade, combining timber frame with reinforced



concrete cladding. This innovative method that has been used in the construction of the RTE Campus (called hybrid timber concrete façade) was developed by AIA Ingénierie, and Rubner Holzbau has elaborated a technical expert report for this procedure.

Indoor areas offer pleasant and high-quality working environments. They provide maximum space for flexible distribution and equipment, which in current times of home office activities are an important aspect to consider. The visibility of the structural frame made of natural wood provides direct insight into building architecture and contributes to a cosy and pleasant atmosphere in the building. Comfortable and inviting meeting zones were created in shared areas with different settings (Cosy, Quick Talk, Serendipity).

Biodiversity was also taken into account in this project. The teams of AIA Environnement have designed a detailed landscape-based environmental plan. Campus outdoor areas offer spaciouly designed terraces to the users, and multiple, specially created water basins provide for additional cooling of the area. The landscape design is completed by a fruit garden. Thousands of insects are attracted by flowering fruit trees and employees can enjoy the rich selection of fruits during all seasons of the year. A natural meadow with picknick area rounds-off the outside sector. All outside paths were implemented with maximum soil permeability rates to compensate for sealed surfaces.



Rainwater is collected and naturally treated in a moist area that is overgrown with water-filtering and purifying plants. The wastewater generated on the Campus is submitted to a preliminary treatment process by oil and water separators and then further treated in constructed wastewater treatment wetlands. Rainwater collected via the roofs is reused in the buildings. Overflow is led into the water basins and then discharged to the moist areas. It was a very conscious decision to flexibly design the entire location, since working and edu-

cational methods will continuously develop in the future thus requiring flexible adjustments, too. Both parties involved in the project, contractor and planning entities, consider it to be their common responsibility to secure the perfect interaction between buildings, environment, and surrounding ecosystems. For this reason, as many construction materials as possible from natural resources were used in the RTE Campus project and particular care was taken to promote biodiversity in the landscape design of the Campus.



Completion: 2021
Building owner: RTE, Lyon (FR)
General contractor: EIFFAGE construction, Lyon (FR)
Architects: AIA Architectes, Lyon (FR)
Planning office - timber: AIA Ingénierie, Lyon (FR)
Timber engineering: Rubner Construction Bois SAS, Chassieu/Lyon (FR)
Surface(s): 20,250 m² (construction site 1: 9,285 m², construction site 2: 10,965 m²)
Laminated timber: 1,400 m³
Timber and concrete frame panels: 11,000 m²
Construction systems: Glued laminated timber pillars and beams, interconnected concrete floor, timber frame façade with façade cladding by prefabricated concrete panels according to hybrid timber-concrete façade system (timber frame is connected to concrete envelope)
Wood types: spruce (pillar and beam structures), Douglas fir (frame elements carpenter works and pillar inside passage)
Photos: Sergio Grazia



NO GLUE – NO METAL

PATENTED CONSTRUCTION METHOD

The multi-storeyed residential buildings made by the holzius GmbH company are increasingly conquering urban environments. The most remarkable feature of all is that wall, ceiling, and roof elements of these houses are produced with no glue or metal at all. To execute this outstanding construction method, holzius uses patented timber connection systems and strengthens - with this building method - its outstanding market position.

Today, an increasing number of buildings are being built as (solid) timber constructions, especially in urban areas. Some clients attach particular importance to sustainable project implementation, and under ideal circumstances buildings shall be erected with no glue, sheets, or other foreign substances contained in timber structures. The company holzius GmbH, which is part of the internationally branched Rubner Group, is considered “the” expert for eco-friendly solid timber constructions and is increasingly focusing on projects in the turn-key construction sector. Preliminary design is the most decisive parameter in the implementation of these projects. Prior to production start, the entire cable routing, and open-

ings must be exactly designed and coordinated with specialist planners. holzius can contribute with planning details from highly demanding and sophisticated projects in terms of structural engineering, fire protection and sound insulation.

An edged dovetail batten - this is the patented core element of holzius-developed construction method. In the production process, battens are pressed into wooden planks, which are then joined to one another - a connection not visible from the outside. Since dovetail battens have a slightly reduced moisture content compared to wood planks, the moisture difference is equalled by this press-in technology thus leading to a stable and load-carrying connection of the elements. Solid timber wall elements

that are implemented as multilayer upright blocks achieve maximum stability and carrying capacities and therefore allow settling-free construction of multi-storeyed buildings. holzius newly interprets this very old wood connection technique and transfers this technique to modern, state-of-the-art projects.

For Herbert Niederfriniger, CEO of holzius, these testimonials are the best proof that building with glue- and metal-free solid timber elements has successfully reached the multi-storeyed apartment building sector and thus urban environments. “Our main target is to create healthy living environments and to preserve intact habitats. This is how we can bring man and nature together.”



BUILDING ASSOCIATION MAX ACHT

A diverse group of users has joined forces to build a climate-neutral solid timber house on the premises of the former Olga hospital in the western part of Stuttgart. In this case, climate-neutral means that the amount of wood that is used for the apartment building stores such a large content of CO₂ that it can neutralise the energy that is consumed for the construction of building components made of other materials. Offering the glue-free construction of all wall and ceiling elements, the holzius company could fully play to its constructional strengths. Much more to that, the building is the first building in Stuttgart and throughout the Land of Baden-Württemberg that has been implemented as building class 4, and that not only provides full timber interior views but has a timber façade as well. In addition, the building complies with all requirements of subsidised KfW standard 55 houses.



URBAN DENSIFICATION IN BAYREUTH

The cityscape in the centre of Bayreuth is basically characterised by ancient and historic houses with sandstone and timber-frame façades. By using holzius-developed techniques, the company VIDA HolzProjekt GmbH is now breathing some fresh air into the Bayreuth government district, an area full of tradition. With a height of 19.0 metres, the apartment building that was concluded in the early summer of 2021, is so far the first solid timber apartment building of building class 5 in Bavaria. Applying the glue-free construction method was certainly the decisive factor for VIDA to have been awarded the project. The fact that holzius holds all necessary structural engineering and fire protection certificates and patents for the materials used and implemented certainly was more than beneficial when submitting the proposal to execute this timber house project in an architecturally sensitive neighbourhood.



VONOVIA APARTMENT BUILDINGS

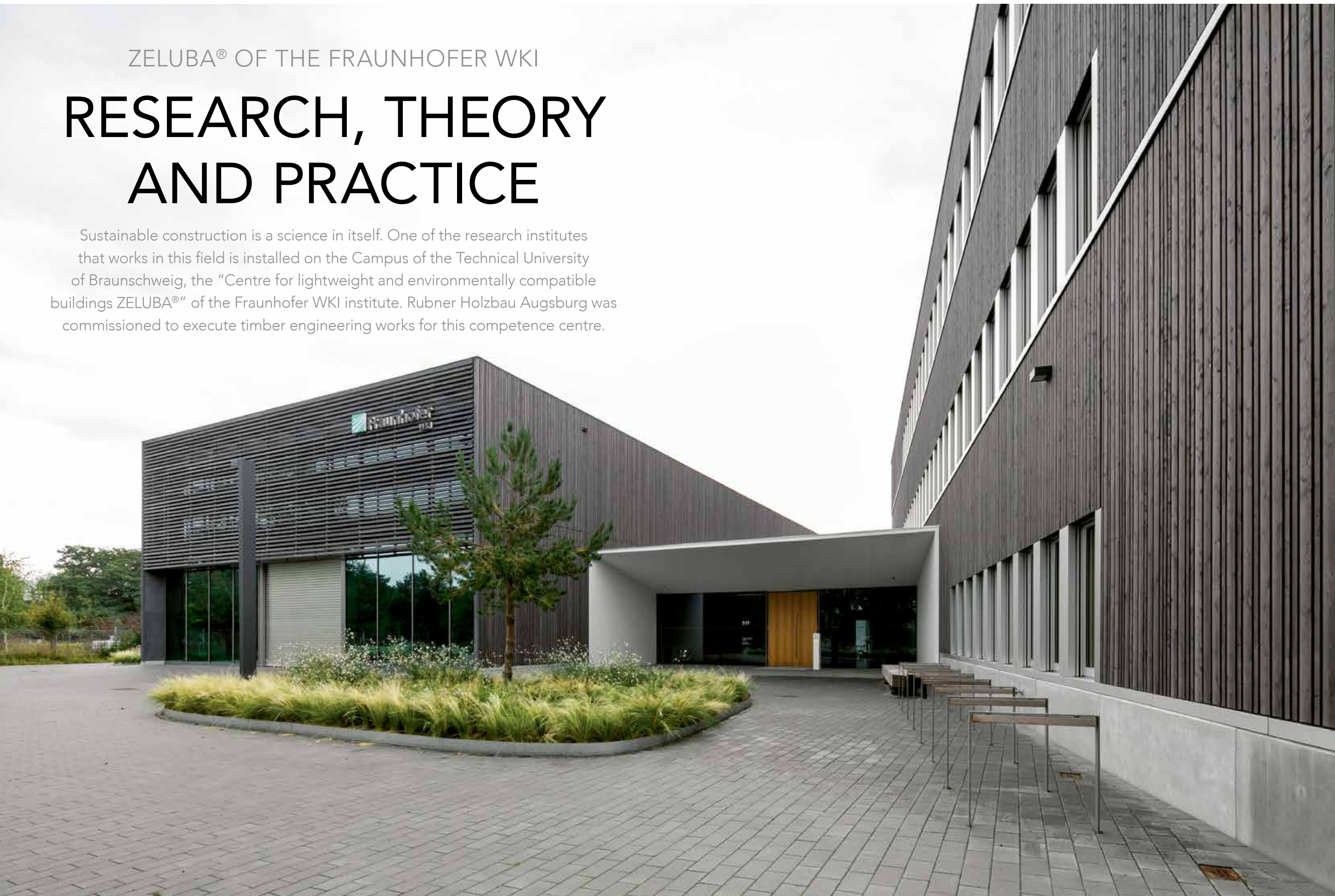
Vonovia, one of Germany's largest residential real estate companies, is breaking new ground. In Kornwestheim, a city located north of Stuttgart, two cube-shaped buildings have been installed by the holzius company. Both apartment buildings are of identical design and structure. Three apartments with living spaces ranging between 55 and 95 m² are installed on each of the four storeys.

One of the basic requirements was to secure that this type of building must be reproducible on any of the Vonovia sites. Therefore, these optimised, timber-structure adapted details secure cost-effective construction of buildings. This project testifies to the fact that the sustainable and glue-free construction method that has been developed by holzius can be used for the implementation of many other multi-storeyed apartment buildings, which can profitably be marketed as rented properties.

ZELUBA® OF THE FRAUNHOFER WKI

RESEARCH, THEORY AND PRACTICE

Sustainable construction is a science in itself. One of the research institutes that works in this field is installed on the Campus of the Technical University of Braunschweig, the "Centre for lightweight and environmentally compatible buildings ZELUBA®" of the Fraunhofer WKI institute. Rubner Holzbau Augsburg was commissioned to execute timber engineering works for this competence centre.





Timber-building industry is constantly developing and enhancing. University institutions, such as the research centre ZELUBA® of the Fraunhofer WKI institute (Wilhelm-Klauditz-Institute) are working with emphasis to push and advance these developments for future applications. Lightweight hybrid materials, construction elements, and structures as well as their individual flammability and environmental properties are being investigated and further developed at the Campus of the Technical University of Braunschweig. The main objective is to support not only industry partners who work in the field of wood materials and prefabricated housing industry, but also craft businesses to develop new systems. Research and development activities require space, and that is why the University Centre - in line with its special field

of research - has decided to erect a building which comprises a single-storey test facility hall and a three-storey laboratory building as modular hybrid construction. Specifications set by the building contractor and/or building user clearly detailed that all modern building materials had to be used according to their constructional strengths and properties.

The new ZELUBA® centre with a total floor space of 1,857 m² is composed of three buildings, which are aligned in a position slightly offset to one another: an office and laboratory building, a test hall and a single-storey foyer that assumes the function of connecting structure between the other two buildings. The foyer, built as reinforced concrete structure, serves as entrance area, seminar room and massive fire-resisting wall. The three-storeyed building, which



houses office rooms and laboratories, has been built by consciously using timber as construction material and design element. The structural frame of the test hall is characterised by significantly higher timber portions. With visible timber and steel construction elements, this sector is clearly recognised as work area. The test hall, which houses an earthquake test stand, has been designed with a post and beam façade that can be seen from the forecourt. The design of the building represents a "Window to Science".

Every single working area of the ZELUBA® centre was analysed in detail and integrated into the static and dynamic overall concept according to general requirements. Sensitive measuring instruments are operated on the first floor of the 14.5 m wide and 46 m long three-storeyed office

and laboratory section. To prevent these instruments from vibrating due to walking-around people or running machines, the floor slab above the ground floor was designed as particularly heavy timber-concrete compound construction with filigree concrete ceilings on timber beams. Since the office rooms, which are also installed in this building, do not have to comply with such strict structural requirements, the ceiling above the upper floor was designed by using the same structure but with reduced dimensions. The roof ceiling on the second floor is simply executed as traditional timber beam construction.

The structure of the test facility hall is characterised by a more simple and functional construction. The 19.8 m wide and 42 m long building is positioned on a traditional reinforced concrete floor slab with a separate pit



for the earthquake test stand. A surrounding strip foundation provides necessary stability to the laminated timber supports of the hall's walls. These supports are arranged in a 2.8 m grid and bear the load of the 19.2 m long ridged roof girders thus forming the building's envelope. Structural engineers opted for the "beam on two supports" system. The test facility hall also houses a crane runway whose steel beams – via console-type supports – span the inside notched glued laminated timber supports. Timber as construction material scores due to its structural properties. This construction guarantees that dynamic loads of the crane movement, and thus resulting forces are largely absorbed by the timber structure.

Rubner Holzbau Augsburg was responsible for factory prefabrication of

solid timber elements and for on-site assembly of these elements. Outside wall elements of the office and laboratory building measure ten metres in length and were pre-equipped in the Ober-Grafendorf factory with timber-aluminium windows, sun protection systems and post insulation devices including aluminium covering of window soffits. These preliminary works secured quick completion of the building envelope and rapid work progress on site. Materials used amounted to 1,114 m² of cladding elements, 868 m² of wall elements, 840 m² of timber-concrete compound ceiling structure and 119 m³ of glued laminated timber supporting structure. In the test hall, timber engineering systems summed up to 737 m² of elements, 1,590 m² of Kerto-LVL panels and 123 m³ of laminated timber elements. Rubner Holzbau processed some 500 m³ of spruce wood for construction, 55 m³



of larch wood for façade cladding and more than 45 m³ of spruce wood for the façade's substructure.

Andreas Fischer, CEO of Rubner Holzbau summarises the project: "Theory and practice of structural timber engineering are brought together in the Fraunhofer WKI Research Centre. We have provided state-of-the-art implementation and our buildings secure that technology, research and development works will be successfully executed thus resulting in future applications. There is no doubt that wood - being a natural and sustainable construction material - will play a crucial role in these applications." Presently, the ZELUBA® Research Institute offers the most state-of-the-art work places and fields of activities for some 40 researchers.

Completion: 2021

Implementation period for timber engineering works: 05/2018–12/2019

Client: Fraunhofer Gesellschaft zur Förderung der angewandten Forschung e.V., Munich (GER)

General Contractor: Carl Schumacher, Wolfenbüttel (GER)

Architects: ARGE ZELUBA®: DGI Bauwerk, Berlin (GER) | schneider+schumacher, Frankfurt/Main (GER), Planungsbüro Hoffmann Landschaftsarchitektur GmbH

Structural engineering: osd – office for structural design, Frankfurt/Main (GER)

Timber engineering: Rubner Holzbau Augsburg (GER)

Glued laminated timber: 310 m³

Wall elements: 868 m²

Timber-concrete-compound ceilings: 840 m²

LVL: 130 m³

Cladding elements: 1,850 m²

Photos: Andreas Muhs, Berlin Bildarchiv



BE FACTORY

CENTRE FOR INDUSTRIAL INNOVATION



The future-oriented centre for industrial innovation has recently been inaugurated on the premises of the former tobacco factory (Manifattura Tabacchi) in Rovereto (Province of Trent, Italy). The incubator concept addresses companies, which execute research, development, and production activities in the fields of green building, sustainable mobility, and sports technology. Eight of the eleven new buildings that have been erected on the 50,000 m² large construction site, have been built with a supporting structure fully made of timber – prefabricated and installed by Rubner Holzbau.

A spectacular and eye-catching business incubator has been erected with “Be Factory” on the premises of the former tobacco factory – Manifattura Tabacchi - in Rovereto. It is the largest civil engineering construction project in the Italian province of Trent, not only in terms of dimensions but also in terms of structural and architectural concepts, since it represents one of the most important load-bearing structures fully made of timber throughout Italy. The entire construction area covers a surface of approximately 50,000 m².

The eight timber executed buildings are interconnected by one single 24,000 m² large roof structure. The building project, which was initiated to upgrade this area, has been strongly promoted and pushed by

Trentino Sviluppo S.p.A., a company dedicated, in general terms, to sustainable regional development and, in specific terms, to the modernisation of the former Manifattura Tabacchi. Good things take time – a group of committed designers headed by Arup, Kengo Kuma and Associates, Carlo Ratti Associati and Kanso has been working since 2009 on this visionary project, establishing planning directives and implementation procedures for the Be Factory project. The start signal for this project was finally given in 2017.

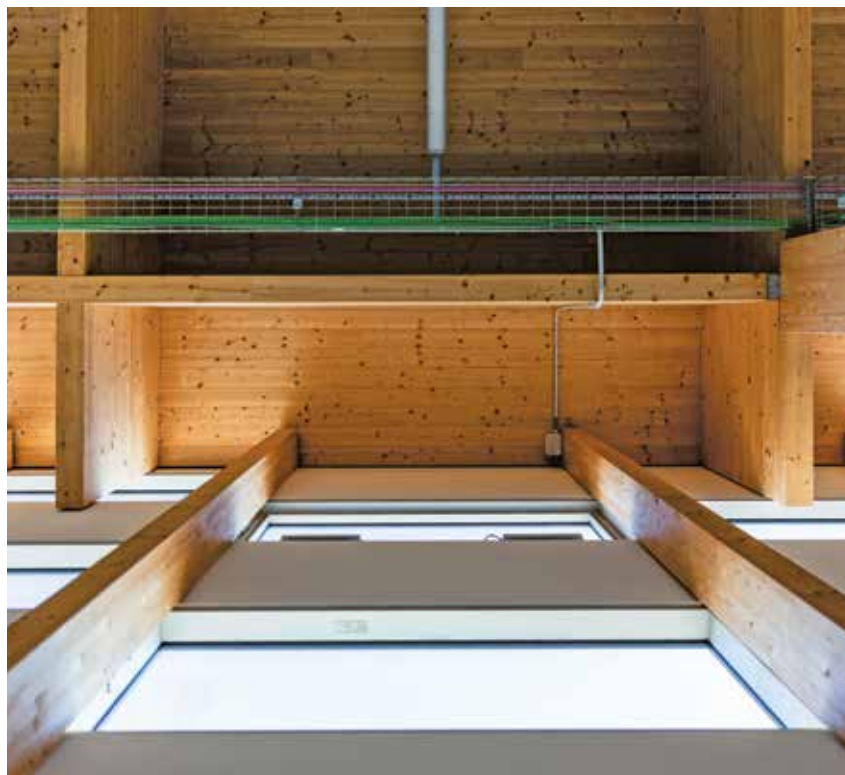
High and manifold demands were formulated for refurbishment and reconstruction works and for the new use of the area. The architectural concept of Be Factory should secure the harmonious integration of this new structure between the vineyards-dominated landscape of the rural environment and the urban setting, create a connection between the former industrial site and the medieval inner city of Rovereto, and establish a relationship to the two nearby flowing streams, Leno and Adige. Be Factory sees itself both as closed space and public area. On the one hand the central roof area offers a common and protected space to all companies that are installed in this research centre. On the other hand, pedestrians are allowed to cross the entire sector thus creating a new connecting path between the city, the cycle path along the Leno stream, and Borgo Sacco, a medieval village located at the Adige river.

In their base area, the eight, timber-designed buildings are planned as individual, i.e. separated buildings but on the roof level the buildings are connected to one another by a large and centrally located distribution area (the so-called “tunnel”). Several side entrances branch-off this tunnel. The

geometry of the timber beams inside the tunnel, which are evenly spaced along the entire tunnel construction, immediately attracts our attention, thus focussing our gaze onto the entire length of the building structure. These beams that have been designed as recurrent conceptual line and bear the entire load of construction elements pursue the idea of a coherent architectural and structural concept. The walkway installed on the roof of the tunnel allows to traverse the entire extensively greened roof areas of these new buildings.

To secure seismic stability, all individual buildings, which appear to be one connected building from the roof’s view, have been designed as independent structures. “Hidden”, seismic joints have been integrated between the tunnel and the buildings in order not to disturb the architecturally important visual appearance of the building complex. The main objective of these seismic joints is to prevent - in the event of vibrations caused by earthquakes - reciprocal, and self-enforcing shocks or impacts within the buildings and within single building sections. This type of structural detachment facilitated static calculation processes since elements and connections of each individual building could be separately analysed and examined in terms of structural requirements.

All structural elements of the eight, newly established buildings, which are provided for development and production in line with “Green Economy” requirements, are fully made of timber – load-bearing elements have been executed by using glued laminated timber. All basic modules are composed of different construction elements: main frameworks that are made of double



Completion: 2020

Building owner: Trentino Sviluppo S.p.A., Rovereto (IT)

General contractor: Colombo Costruzioni S.p.A., Lecco (IT)

Masterplan: Kengo Kuma and Associates, Tokyo (JP)

Timber engineering: Rubner Holzbau, Bressanone (IT)

Total area: approx. 50,000 m²

Roof surface: approx. 24,000 m²

Glued laminated timber: approx. 4,000 m³

Cross laminated timber (X-Lam): approx. 3,000 m³

(with lengths of up to 16.60 m)

Photos: Trentino Sviluppo S.p.A.

conically-shaped beams and transversally arranged to the rectangular floor plan are supported by fourfold assembled columns; edge beams, which lead into the longitudinal direction of the buildings, and which connect the main portals; numerous secondary beams, which are connected to the edge beams by spans of up to 17.5 metres; and numerous additional structural elements, which prolong transverse beams up to inside edges of façade modules, just to name a few of them. The entire timber structure complies with fire resistance class R60 requirements. Load-bearing areas of the roof construction are fully made of cross laminated timber elements (XLAM), panels are composed of five layers with varying thickness depending on the different load ranges on the roofs. All elements are fixed to the load-bearing construction by using bolts and metal struts.

All structural elements that have been used in the Be Factory project on the site of the former Manifattura Tabacchi in Rovereto have been fabricated in the Rubner Holzbau factory based in Bressanone. In this factory, Rubner timber experts have cut, formed, bored, and prefabricated some 7,000 m³ of spruce wood to produced beams, supports and panels with the help of CNC machines. Most of the structural composite elements were already pre-assembled in

the factory, e.g. the composite pillars in the main frame structures and the composite beams of the tunnel. Due to these high prefabrication rates, construction times on-site were kept efficient and short. Backed by intelligent construction site logistics and organisation, it was possible to execute and complete all works required for erection of the eight buildings, construction of the tunnel, reinforcement of the façade by more than 1,100 glued laminated timber columns and installation of some 24,000 m² of roof elements made of XLAM timber within a period of little more than five months.

Key parameters of this project, pioneering and path-breaking not only for the region but for the entire country, are more than impressive. Today, Be Factory represents an exciting mixture of historic building architecture and modern, sustainable timber constructions. All refurbished historic buildings comply with certification requirements of energy class C/D, the new buildings are energy class A certified. The green roof area planted with sedum, covers a surface of approximately 30,000 m². Natural rainwater is used both for plant watering and for other on-site purposes, which results in a water saving potential of approximately 60 %. The combined heat and power plant has an annual production of 4,200 MWh of electric

energy, 6,400 MWh of thermal energy and 270 MWh of cooling energy. Due to all above-listed measures and the efficient use of sun radiation for natural lighting of inside spaces, primary raw material requirement from non-renewable energy resources is reduced by an impressive 70 %. Finally, a total of approximately 4,312 tons of CO₂ can be saved by the material volume of timber, which is used for the construction of the new buildings on the Be Factory site compared to fabrication, transport and disposal activities that would have been required using conventional construction materials.

Peter Rosatti, CEO of Rubner Holzbau, underlines socio-political importance of the extension of the former Manifattura Tabacchi in Rovereto: "By implementing the Be Factory Project, not only the autonomous Province of Trent, which acted as catalyst and financial promotor of this project, but also architect Kengo Kuma, who defined the project's functional and design features, have proven their visionary farsightedness. With the execution of this project, the timber engineering sector has been able to demonstrate today's technical possibilities, and Rubner Holzbau has more than proven that this type of future-oriented concepts can be professionally implemented."

UNDER CONSTRUCTION AND COMPLETED PREVIEW

GERMANY

Acting under the "School's Sports Halls Rapid Construction Programme" initiated by the Senate Government of the Land of Berlin, and on behalf of the general contractor Gustav Epple, Rubner Holzbau Augsburg is presently building nine type sports halls. Seven triple sports halls with 60 visitors' seats each, and two triple sports halls with 199 visitors' seats each are being built based on the design of the architects' association scholl.balbach.walker. With this project, the Berlin Senate is implementing the "Investments for better Education" programme. Thanks to its modular construction and standardised structural frame, the sports halls can be rapidly adjusted to any of the different locations. This type-construction concept paired with large, factory pre-fabrication rates allow rapid and economically efficient project implementation with high service life and environmental sustainability.



AUSTRIA

The Seepark Wörthersee Resort is enlarging its wellness area by a newly built sports and relaxing sector (Move & Relax-Concept). All enlargement works and the installation of additional storeys to existing buildings were executed during ongoing hotel operation. For this reason, the building owner decided to use timber as construction material since the low weight of the material and high factory prefabrication rates allow rapid implementation of the project with as little impacts on the guests' comfort and on the environment as possible.



DUBAI

In the scope of the Dubai Expo preparatory works, Rubner Holzbau Bressanone has executed timber-built pavilions for four exhibiting countries: "Innovating for a Shared Future" for Great Britain, "Opportunities over Time" for the Sultanate of Oman, "Diversity in Harmony" for Belgium and "Seeds for the Future" for Azerbaijan. Besides workshop planning and factory prefabrication activities, Rubner was also charged with transport and on-site assembly works (except for the Belgian pavilion). Even the most complex requirements set by the architects were successfully solved by Rubner Holzbau to the entire satisfaction of all parties involved in the project, the decisive factor being that the timber engineering company had been involved in project execution at a very early planning stage.



FRANCE

In the 13th arrondissement of Paris, above the tracks nearby the Gare d'Austerlitz (the Austerlitz Station), the "New G" is presently being built. With eleven storeys and a height of 38 metres, it will become one of the highest timber buildings in the French capital city of Paris. The residential and commercial building based on the design of AAVP Architecture and Agence Catherine Dormoy architects, executed by Rubner Holzbau France, will be the first building in France that is being erected on the grounds of the Nudge Concept. Nudging describes the stimulation of individuals by positive reinforcement and little, indirect suggestions, so called nudges, to change towards the desired, i.e. a more sustainable behaviour. In a type of vertical village amongst this metropolis, everything is meant to revolve around living within a community. The design includes 130 apartments, artists' studios as well as community and commercial areas. Project conclusion is scheduled for 2022.

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