

Timber and Technology

Conversion of existing buildings



Timbatec
Timber and Technology

Reconstruction, addition of floors, extension and renovation

The conversion of existing buildings stems the housing sprawl and protects the climate. We are illuminating this topic with four unique building projects, interviews, facts and figures.



Pictures:
1 Damian Poffet
2+3 Timbatec/Nils Sandmeier
4 Roger Frei

Cover picture:
Addition of floors Bernapark, Deisswil (Stettlen),
Timbatec/Nils Sandmeier

- 1 Reconstruction Baerenplatz, Berne
- 2 Addition of floors, Bernapark, Deisswil (Stettlen)
- 3 Extension Hospital floors, Fribourg
- 4 Renovation Haus zum Lindengarten, Klosterneuburg near Vienna

Dear partners, customers and timber enthusiasts

Conventional buildings shape the unique architectural landscape of every village and city. To acknowledge the importance of conversions for maintaining a building's architectural character is essential for such building projects. And to build with what already exists stems the housing sprawl and saves embodied energy by reducing the need for new building materials. Wisely reconstructed buildings are often comparable to newly built ones from an energy-efficiency perspective and thus still meet the needs of its inhabitants.

The conversion of existing buildings can be divided into four main sections: reconstruction, addition of floors, extension and renovation. The building material timber has the lead in all four sections. It usually is the most suitable choice of material for addition of floors due to its light weight whereas the fast and low-noise assembly on site is a major advantage for timber in regard of extensions and renovations. All these benefits make it expedient for investors to build with the sustainable building material and helped the timber industry to gain its eminent image on the market.

This edition of our magazine is dedicated to the topic "conversion of existing buildings" to give insight in some of our successfully executed projects. We have developed static solutions for Bernapark, so the landmarked factory could be extended with two additional

floors (page 4). We also renovated and extended a psychiatric center in Fribourg with it being the first hospital in timber construction (page 8). And we converted three landmarked buildings in the heart of Berne by hollowing them out and reconstructing them according to modern building standards (page 10).

At the beginning of every conversion is a CBEC (Cantonal Building Energy Certificate) evaluation, to later obtain subsidies. As certified CBEC experts and leading timber engineers we offer competent supervision in all our projects, covering all stages from needs assessment and building energy certificate up to the completion of the project. With our all-round service we are certain to help prevent the urban sprawl by planning a resource-optimized building. Reconstruct or enlarge your building with a suitable extension or an addition of floors.



Simon Meier
Head of Marketing
Timbatec Timber
Construction Engineers
Switzerland Ltd.

Timbatec offers the all-round package

A building is more efficient and economical if it is understood as a whole. When it comes to planning timber constructions, the best idea is to consult a timber construction engineer who has skills that go beyond mere structural design. We offer an all-round package in planning and will support you through to execution. We will also gladly develop solutions for your project where none yet exist. Our core competencies:



Large-scaled addition of floors

The venerable cardboard factory in Deisswil, a suburb of Berne, underwent a thorough renovation and an extensive addition of floors in order to create hubs for startups and modern living space.



Addition of two floors on a land-marked factory.

Picture: Timbatec/Nils Sandmeier

This is the factory where once over 250 employees manufactured the national supply of cardboard. Up to 500 tons of cardboard left the industrial area each day. The site was shut down in 2010. Hans-Ulrich Mueller then bought all the shares and the land to reinstate the entire personnel with the goal of preventing the industrial area from decaying. In time, he began to envision this area as a place where people live alongside one another.

The over 100-meter-long factory along the rails of the RBS railroad company and the other, more staggered building had to be preserved, as they are landmarked. These two buildings were elaborately renovated and transformed into lofts, ateliers and small shops. And the addition of two floors further provides over 13,000 square meters of living space.

Static concept based on the existing building

The landmarked factory – a solid construction made of ferro-concrete and bricks – consists of a 140-meter-long oblong building and a 70x40 meter wide building. Both buildings are

18 meters high and were extended by two floors or, in other words, 6 meters in height. Thus, the addition of floors must be able to withstand high exposure to wind power and seismic force. Usually, the static concept is designed to divert all forces through the foundation into the ground. But with Bernapark such an approach was not possible as the existing buildings predefined where the forces of the additional floors had to be diverted to, which was mostly through the supporting columns within the exterior walls. This resulted in a static concept with lots of crossbeams, various changes of load-bearing directions and some rather large spans.

Bulkhead structure as the suitable building system

The two additional floors were erected in bulkhead structure. The so-called bulkheads are load-bearing walls, which are oriented in transverse direction to the building front. They are constructed as two-sided planked slabs to ensure the building's bracing. Above these bulkheads lie the box girders with 280-millimeter-high glulam ribs acting as part of the ceiling

elements. The width of these ribs varies, depending on the span, between 60 and 180 millimeters. The box girder elements were filled with limescale fragments for optimizing the sound protection and vibrational behavior and were then topped with a common floor structure. The non-bearing exterior walls are placed between the bulkheads. The timber component is also visible in form of a spruce shuttering on the terraces. Other parts of the facade are plastered to uphold and integrate the factory characteristics. This way the appearance of these additional two floors reflects the project's essence perfectly.

Fire protection and building physics

The additional floors are accessed by two preexisting stairways and two newly built ones – made of wood. The REI 60-RF1 fire protection regulations are complied with thanks to complete encapsulation of all elements. Similar to the roof, where 30 minutes of fire resistance had to be ensured, due to the ventilation devices mounted on top.

“Wood as a resource is an all-rounder”



Picture: courtesy of Bernapark AG

Hans-Ulrich Mueller, owner and ALA of Bernapark AG, is an entrepreneur and sponsor of SMEs. In Bernapark, his most significant building project so far, he chose to use the sustainable building material timber.

Hans-Ulrich Mueller, you made it happen to breathe new life into Bernapark. Today about 300 people inhabit these buildings, and it offers workspace for another 500 people. Are you happy with this?

Yes, because this is where life pulsates. Families, couples and singles of all ages live in Bernapark. Residing startups refine innovative inventions and local artists create new things. Bernapark has developed into the wonderful ecosystem I had always envisioned – a place where people can find everything they have been longing for. So, to answer your question: Yes, I am very happy with it.

What makes the converted buildings special to you, personally?

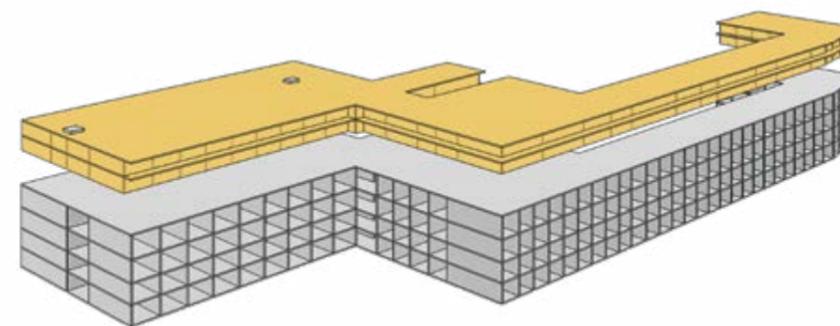
What I like most about them is the symbiosis of old and new components. It would have been a waste to completely erase the historical and still intact substance of the old cardboard factory when you could still use it. With Bernapark, such as with many other projects, we have proven that it is possible to preserve the witness of the past and still meet the needs of the present.

You mention the building structure to be made of timber. What is your opinion of this particular building material?

Thanks to the use of timber, we were able to use light-weight construction. It is quite different to what it would have been using concrete and bricks. In the case of Bernapark, timber has proven to be the appropriate, even perfect, resource for building such complex and contorted structural shapes. Therefore, I embrace the use of timber and hope that we can continually increase the use of this resource within the building industry.

A lot of investors agree with you and the timber industry has witnessed its rising reputation on the market. Why do you think this is?

Wood as a resource is an all-rounder. People want to feel comfortable within their walls. It creates a cozy, warm atmosphere and is thus, from a social perspective, of great importance. At the same time, timber is nice to the eyes and acts as a wonderful contrast to concrete. To me personally, it is not a question of whether to use it or not, but rather my great fascination for the synergy between timber, concrete and masonry.



The addition of floors is over 200 meters long.

Architecture

GHZ Architekten AG, Belp

Building owner

Bernapark AG, Stettlen

Timber construction engineering

Timbatec Holzbauingenieure, Berne

Timber construction

Stuber & Cie AG, Schüpfen

Civil engineering

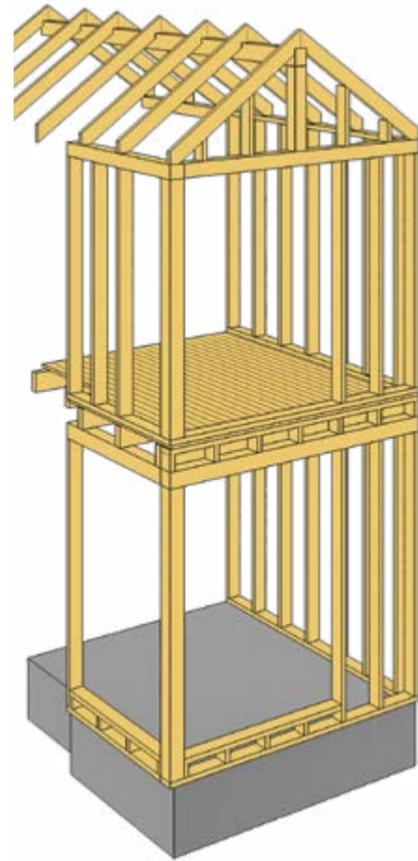
ingenta ag, Berne

General- and subcontractor

Implenia Schweiz AG, Berne

The single-family house receives an upgrade

The single-family house receives an upgrade to meet the new inhabitants' needs by altering the building with a two-floored extension and a core renovation. The extension merges nicely with the existing building.



The new extension appears in beautiful patina only two years after completion.

The single-family house in Klosterneuburg, a suburb of Vienna, has gotten a bit long in the tooth. Its referential heating energy demand had met the lowest and worst stage G on the energy performance scale. The less than 9-square-meter kitchen wasn't very inviting to cook in any longer either and the unused attic was valuable storage space needlessly given away. Also, the inhabited space had become too small for the necessities of the owners. So, the house underwent a renovation and received an extension.

The 13-square-meter extension at the back of the house is built in common frame structure and is merging nicely with the main building. It extends the living room on the first floor and

offers an additional sleeping room on the floor above.

The original building got upgraded by reconstruction: two new rooms emerged in the former attic, all interior walls were removed and a spacious new kitchen was installed. The thus missing load-bearing interior walls were replaced with two beams made of steel. Due to the good insulation of the extension, as well as a partial insulation on the roof, the building has been lifted two whole stages on the energy performance scale, all the way up to stage E. The energy performance certificate forms part of each conversion of existing buildings and is among a range of services Timbatec provides.

Architecture
Andreas Dreer, Kritzendorf

Building owner
Fam. Rocco, Vienna

Timber construction engineering and on-site management
Timbatec Holzbauingenieure, Vienna

Timber construction
Ing. FUCHS Ges.m.b.H, Klosterneuburg

Grand building complex undergoes renovation

The Haus zum Lindengarten, built in 1725, appears in new glory. Thanks to extensive renovation and new fire protection, the historic building complex now meets today's building standards.



Architecture
Edelmann Krell, Zurich

Building owner
Amt für Hochbauten, Zurich

Timber construction engineering
Timbatec Holzbauingenieure, Zurich

Civil engineering
AF Toscano AG, Zurich

Site management
Anderegg Partner AG, Zurich

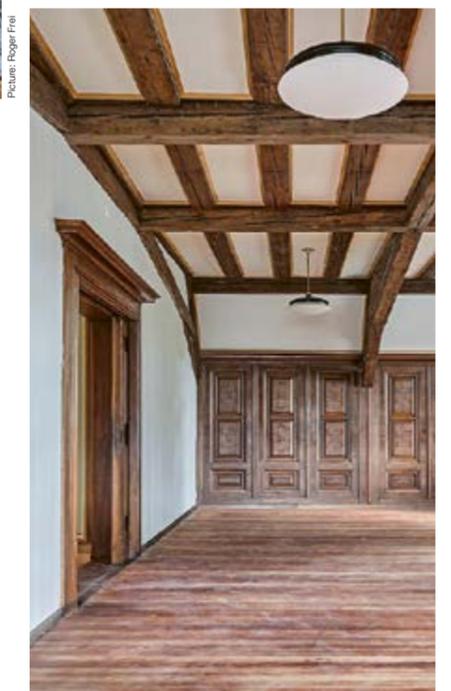
The building remains in similar appearance from its creation to after renovation.

The Haus zum Lindengarten lies in immediate proximity to the Kunsthaus and Schauspielhaus, in the heart of Zurich – and to make it clear, this is far more than an ordinary house. The grand building complex was erected in the early 18th century as a living house, when later a washing house and a shed leading to the linden garden were added. Together they make one impressive ensemble of a building. Since 1931, the Haus zum Lindengarten has been in ownership of the city council of Zurich, and it is where many objects of communal significance are kept and preserved.

The buildings had to be renovated to today's standards without changing the fundamental character of the landmarked Lindengarten. In other words: the renovation was to take place with the least possible intervention on the

existing building substance while assembling new cables and cords for water, heating, cooling, ventilation and electricity. Thus, the necessary openings in the walls and ceilings were planned meticulously and in consideration of all static and fire protection regulations. This mixture resulted in an interesting field of tension between newly valid regulations and the requirements from the landmark institution.

Another great accomplishment of the renovation are the two additional floors on top of the main building: the lying roof-truss construction spans from exterior wall to exterior wall and thus offers a lot of space for new office rooms as well as a column-free, spacious meeting room.



Hospital made of timber

What seemed impossible for a long time is now reality: hospitals made of timber. A former Catholic monastery, in immediate proximity to the cantonal hospital of Fribourg, was converted into a psychiatric center and extended with two new buildings – one of those completely made of timber.

In the psychiatric center FNPG, children, adolescents and adults are taken care of and the demand on space has increased over the years. Thus, the building complex from the 1980s was renovated and extended in three stages: first, the original buildings were renovated, then the building complex was extended with two new houses. Building F is one of a kind: it is Switzerland's first hospital made of timber – including the elevator shaft, the staircases and all load-bearing components.

High requirements for fire protection

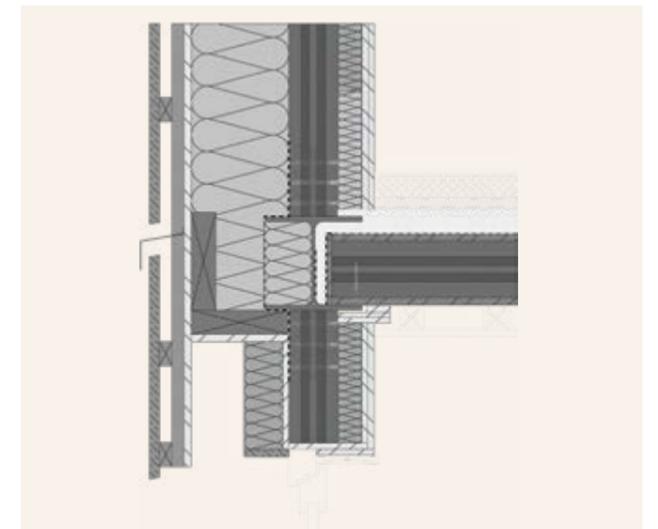
The fire protection concept states that every room must function as a separate fire sector. In case of an outbreak of fire, each patient must be safe for at least 60 minutes and a direct exit must be guaranteed. To rise to those challenges new and carefully thought-out solutions were developed: the new building could be used as part of the flight route in case of fire in the existing building. The load-bearing and fire protection compartmental components are fully encapsulated. In other words: flammable building components were fully encapsulated so as to be declared non-flammable, by using materials such as plastered fiberboard.

Merger with an existing building

The new timber building, labeled with a Miner-ge-P certificate, was to merge with an existing building. This required meticulous planning of the extension as well as thorough knowledge of the existing building. Thus, the old building was measured out via Tachymeter, a gauge that captures all visible points of a room or building, which can then be uploaded onto a 3D-modeling program. This made it possible to illustrate the building, plan and construct accordingly and thus allowed to prefabricate all timber elements in the carpentry workshops while ensuring their fitting on site. The sound insulation in this project was executed with an elastic bonded bulk. This way, the use of concrete could be avoided, as well as the long drying times that would come with it.



All timber elements as well as the ceiling-integrated steel beams are encapsulated for fire protection.



Timber buildings are safe

Timber is a safe building material, also in regard of fire protection. The current requirements of the fire protection regulations BSV 2015 acknowledge that and thus allow new possibilities for building with timber. Since their implementation, all buildings can be built in timber – regardless of their use. In other words: timber is now also a building material that doesn't need special permission. The fire protection regulations differentiate two standard concepts:

- Structural concept: Fire protection concept with mostly structural measures to take
 - Extinguishing system: Fire protection concept with mostly technical measures to take
- Each concept comes with different requirements for the construction and its components. For the new building of the psychiatric center FNPG in Fribourg, the structural concept was chosen.

This extension contains Switzerland's first hospital in timber construction.

Architecture

LZA Architekten AG, Fribourg

Building owner

Réseau Fribourgeois de Santé Mentale, Marsens

Timber construction engineering

Timbatec Holzbauingenieure, Berne

Timber construction

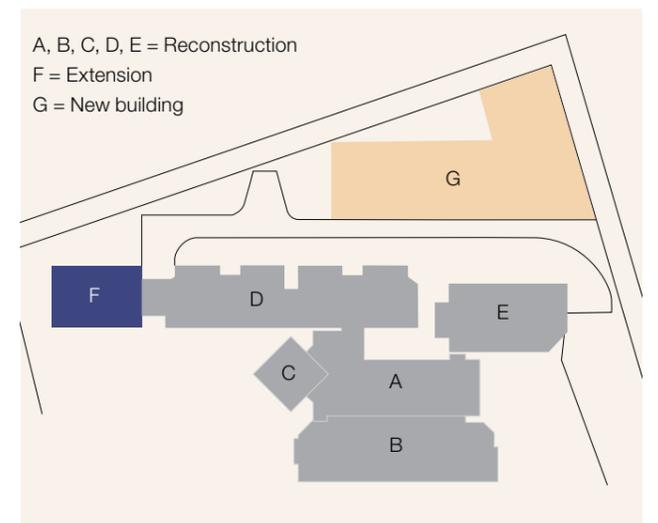
Zumwald und Neuhaus AG, Zumholz
Vonlanthen Holzbau AG, Schmitten

Civil engineering

sd ingénierie fribourg sa, Fribourg

Site management

LZA Architekten AG, Fribourg



Reconstruction under landmark protection

All reconstruction measures should be taken in full consideration of the original buildings' character to ensure seamless integration. Especially when it concerns historic oldtown houses, such as the ones at Baerenplatz in Berne.

Building owner

Septima AG, represented by PSP Management AG, Zurich

Architecture

Spörri Graf Partner APP AG, Berne

Site management

Eberhart Partner Bauleitungen AG, Berne

Timber construction engineering

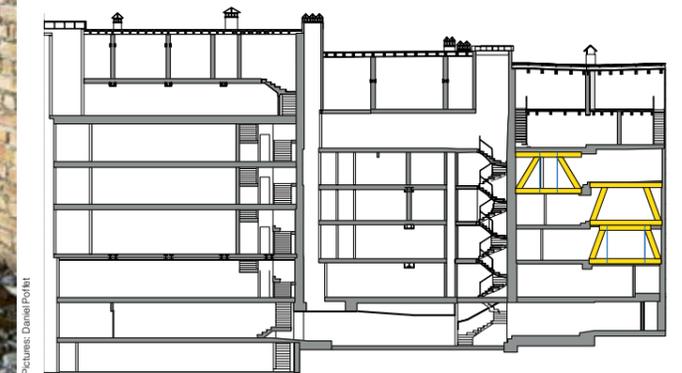
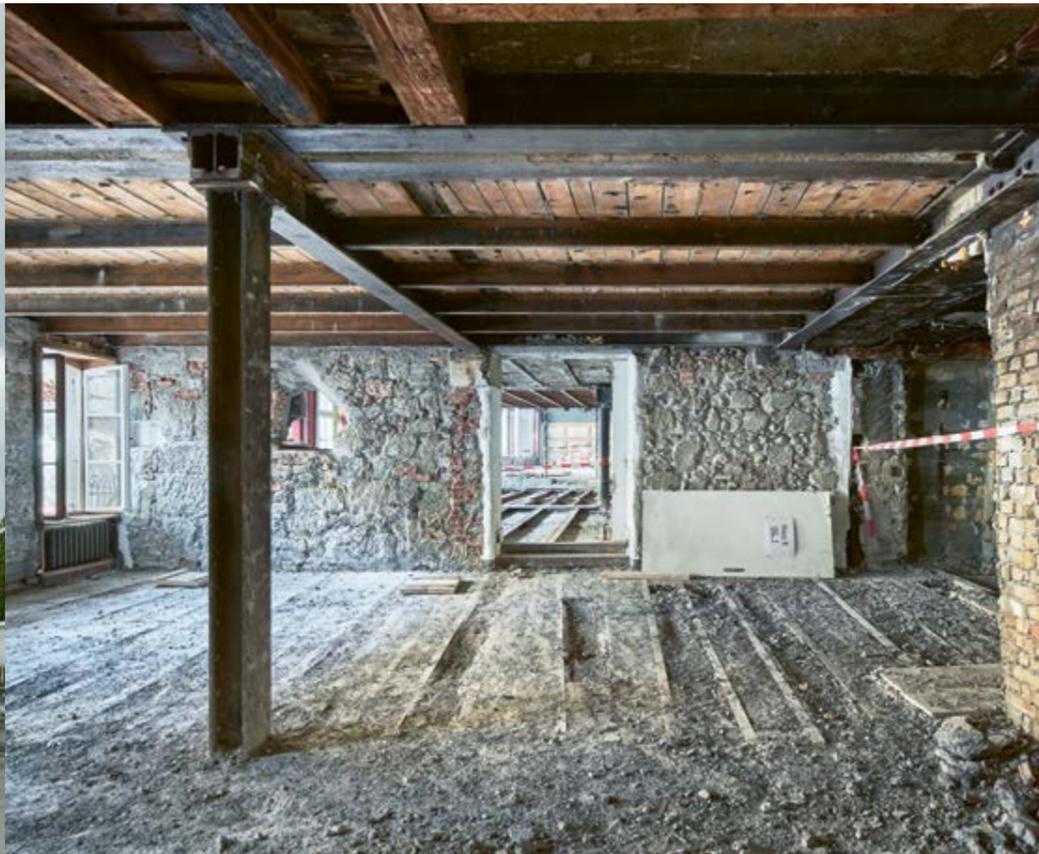
Timbatec Holzbauingenieure AG, Berne

Timber construction

Boss Holzbau AG, Berne

Civil engineering

Ingenta AG Ingenieure + Planer, Berne



The three buildings at Baerenplatz 9, 11 and 27 are part of a row of houses near Baerenplatz, between Bundesplatz and Kaefigturn, locally known as "die Front". These buildings had to undergo core reconstruction. Due to this, the restaurant Plattform had to be closed along with the cake shop Gfeller and the brasserie Edy, which both had shops and office rooms there. All this was necessary before the reconstruction could begin.

The ancestral chart room

In a first step, the new prime contractor PSP Swiss Property had to scan all three buildings to check for potential historical treasures. This was done by means of a stratigraphic evaluation on all walls, ceilings and floors. The paint

was stripped layer by layer to inspect what lied underneath. At the building Baerenplatz 27, the house which lies closest to Bundesplatz, an entire wall of paintings was discovered. It was found to be an ancestral chart dating back to the year 1685. Such discoveries are made once in a lifetime and had to be preserved. These paintings were then gently restored and reintegrated into a new apartment.

The building structure

The existing buildings were not only examined as to historical paintings, but also in regard of their building structure and its static condition. The three buildings, with six floors each, are separated by a fire wall. The house 27, the oldest and integrally landmarked building, is

made of massive sandstone brick walls and wooden ceilings. The other two houses, numbers 9 and 11, were built with several different materials. The lower floors consist of large, in concrete-embedded steel beam constructions with hollow bodies in between. And the ceilings on the two top floors, as well as their roof, are made of timber.

The multiple previous renovations on these buildings had left their toll: some adjustments were made without calculating or documenting their respective structural forces. That is why a reconstruction was long due.

The reconstruction measures

The goal of this reconstruction at Baerenplatz was to create modern living and workspace.

Ventilation, cooling and electricity, all of it should be installed, as well as meet the respective structural requirements, with the least possible interference on the buildings themselves. "High-tech in landmark protection" was the main demand. Nowadays, so-called trusses act as intercept constructions for redirecting all forces from the floors into the floors beneath. Nogged, planked on both sides and painted accordingly, these trusses integrate well into the existing structure without being noticed. As for the ancestral chart room, a hidden steel construction was erected within the existing columns. This construction of four angular pipes carries the forces from the floors above while the historical room remains unchanged in its appearance.

The collaboration

Working in landmarked buildings demands compromises and constant dialogue. If this is well managed, a lot of inventive solutions can emerge. Communication between the architect and the planning team is essential for such an endeavor. Mutual respect and full understanding for the respective inputs form the basis for a successful collaboration. And the planning team must understand and cherish the "language" of the landmark protection committee and that of the prime contractor, or rather the future tenants, in order to develop suitable solutions for each arising challenge.

Timber trusses carry the historical building.

Our team

Teamwork is key at Timbatec

Teamwork and trust are key for a sustainable and successful collaboration. Therefore, we all meet four times a year for advanced training and to have fun.

Timbatec is at the pulse of innovations. This is only possible if everyone is motivated and well-trained. Therefore, every employee has a total of one hundred hours a year for advanced training. Basic education such as graduation from a college or timber engineering studies are the ideal preconditions for a career at Timbatec. But different educational backgrounds should not keep you from applying if you are motivated and ambitious, and if you like challenging and interdisciplinary tasks. We value timber and want to create great things with all the natural and human capabilities available. This is also why parttime work is possible in all positions throughout our firm.

Our team spirit is strong – at and outside work.



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3-6 Timbatec



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