

Timber Basements

Lower ground floors made
of timber



Timbase
Timber Basements



Everything speaks for timber

Welcome to Timbase

Timber construction is booming. Professional investors and the public sector are relying on the renewable building material. And not without reason: timber construction projects are completed in record time – for the same price as projects based on steel and concrete. Timber is by far the most ecological building material. It grows back in our forests and stores CO₂ while it is growing.

Today, concrete basements are standard. This involves the release of massive amounts of CO₂. Our goal is the complete abandonment of steel and concrete in the construction industry. That is our contribution to climate protection. Building basements using timber is an important part of achieving this aim.

Timbase is a Timbgroup company. Come on in. See for yourself how a basement would be a good foundation for your timber construction project. When planning basements, we work in close cooperation with the engineers from our sister companies Timbatec and Timber Structures 3.0.

Stefan Zöllig

First timber basement

What seemed impossible for a long time is now reality: the first apartment building with a basement completely made of timber has been realised in Thun.



Building land and real estate prices have increased enormously over the past few years. This requires exploiting every inch of a building thoroughly and wisely. When basements are built with timber instead of moist concrete, a cosy living space can be created. This is exactly what Regula Bircher and Stefan Zöllig have done in their building consisting of five apartments in Thun. The first timber basement in Switzerland provides space for a multi-purpose room with a communal kitchen, office and workshop rooms as well as a guest bedroom. In addition, the approximately 200 m² basement offers space for a laundry, installations and cellar compartments with plenty of storage space.

Yoga lessons in the basement

Around ten people from the district come to the timber basement once a week for a yoga

lesson with Doris Baumgartner. "Various exercises/Asanas are done on the bare wooden floor, for others we sometimes use yoga mats," says the yoga instructor. The wooden look and the warm surfaces in the basement are calming and cosy, supporting body and soul during yoga.

Economical and climate protective

It is not only the users that are pleased with the timber basement. It is also good for the investors and the environment alike. This is because steel and concrete are some of the most climate-destructive building materials in existence. Stopping the use of these building materials, including for basements and floor panels, makes a valuable contribution to climate protection. Furthermore, a basement built with timber is assembled much faster than its counterpart in reinforced concrete.

The atmosphere in the basement is just like in an apartment.



Report in NZZ-Format on Switzerland's first timber basement.



Architecture

HLS Architekten, Zurich

Building owner

Yamanakako AG, Thun

Timber construction engineer

Timbatec, Zurich

Large areas in timber

TS3 Timber Structures 3.0 AG, Thun

Timber construction and general contractor

Stuberholz AG, Schüpfen



"The communal room in the basement is the ideal place for yoga lessons thanks to the cosy atmosphere created by the use of wood."

Doris Baumgartner

Iyengar yoga instructor, www.bern.yoga



Timber basements – quick to build and kind to the environment

Concrete basements are standard in Switzerland today – but that is set to change soon. Not least because basements made of timber are more environmentally friendly and take significantly less time to build.

Steel and concrete are the favoured building materials today, but are very CO₂ intensive. One cubic metre of reinforced concrete creates around 500 kilograms of CO₂ emissions, whereas one cubic metre of timber stores about one tonne of CO₂. If the wood is burned after being felled or the dead trunk is left to rot in the woods, the CO₂ is released into the atmosphere again. This can be prevented if it is used for building instead. The CO₂ stays within the material – as long as the building or component exists.

222 tonnes of CO₂ saved

If we want to achieve climate neutrality by 2050, we have to stop building with steel and concrete now and invest in timber building instead. Anyone who wants to contribute to climate protection builds with timber. A total of 222 tonnes of CO₂ are stored in the apartment building on “Blüemlimattweg” – 126 tonnes of it in the basement alone. If the basement had been built in solid construction, the manufacture of these materials alone would have caused 360 tonnes of CO₂ emissions. This is a difference of 493 tonnes of CO₂.

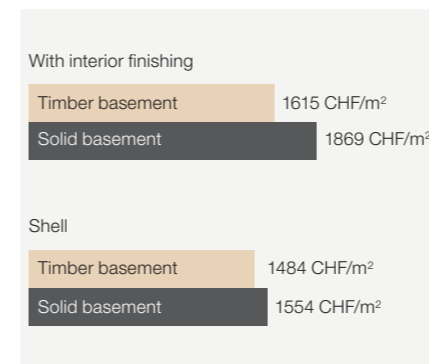
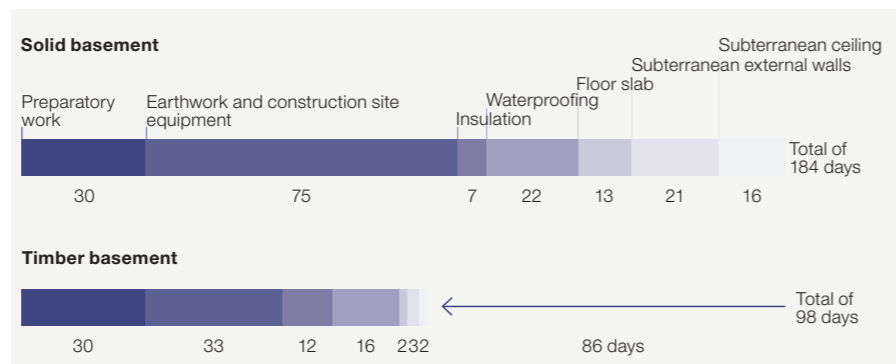
Built in half the time

Basements made of timber are not only good for the environment. They are also much faster to build. In the case of the project in Thun, 98 days were enough to build the timber basement and cover it with the floor slab. The construction of a comparable basement in solid construction would have taken around 184 days. One of the major advantages of timber construction is the fast construction time. So why not put this advantage to use in basements?

Building basements in timber allows for a considerably shorter construction time.

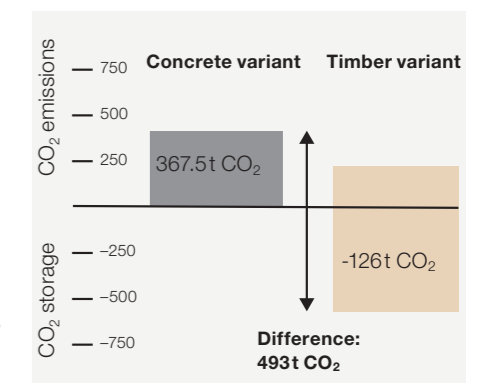


The ceiling above the basement acts as a floor slab for the timber construction.



When it comes to interior finishing, the cost advantage is particularly noticeable because there is no need for a floor covering.

Thanks to the selection of timber as a material, more than 500 tonnes of CO₂ were saved.



It all depends on the right assembly

Kept dry, timber lasts forever

The most important principle in timber preservation is protection against moisture. Kept dry, timber lasts forever. The solution: a spatial monocoque made of timber with construction details as seen in flat roofs.



1 Insulation boards with a thickness of 160 mm are laid on a layer of chippings.



2 A non-woven fabric protects the waterproofing and the moisture monitoring.



3 Moisture monitoring and the EPDM foil are central components.

Cross-laminated timber panels are placed on a layer of chippings and a 160 mm thick insulation board. Black insulation encases the timber for moisture protection. Moisture monitoring checks the watertightness at all times and ensures the longevity of the basement.

Waterproofing as seen in flat roofs

An EPDM foil, standard in flat roofs, was used for waterproofing and was complemented by various layers of non-woven fabric. There are fewer influences underground than would be the case for roofs, where the construction could be damaged by taproots, birds and the weather. However, the floor has to be able to withstand roots and the damming pressure of water.

For large-scale areas of timber

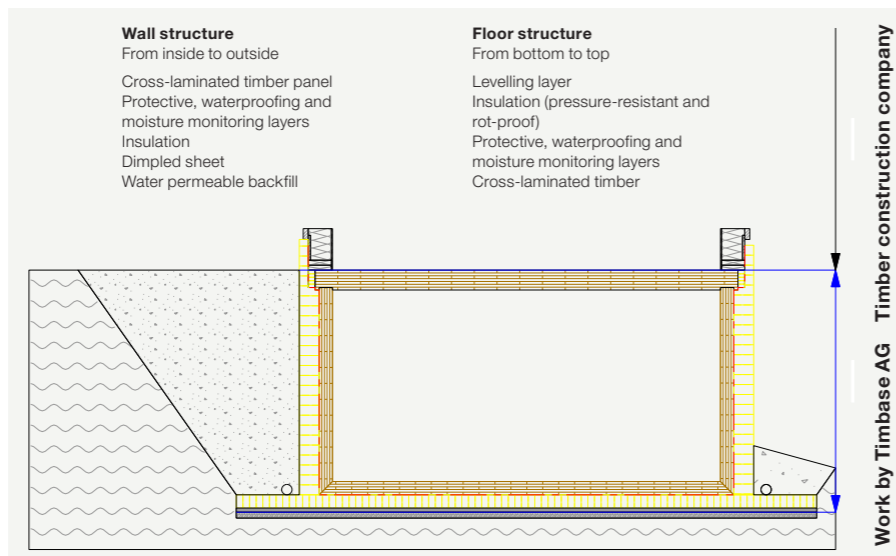
TS3 joints connect the individual CLT panels together, creating a spatial monocoque made of timber. This is all made possible with Timber Structures 3.0 technology, or TS3 for short. This is a procedure developed by Timbatic that can be used to generate large areas made of timber. For this purpose, the cross-laminated timber panel manufacturers treat the end faces of the panels in the production plant with a primer and sealing tapes. On the construction site, the panels are then sealed with a two-component polyurethane casting resin without pressure. This construction was used for the whole basement in Thun. Among other things, this is how the floor slab or ceiling above the basement is created, acting as the foundation and load

distribution slab for the timber construction above ground.

Sill plate assembly made simple

Modern timber houses are prefabricated in production halls with millimetre precision. Carpenters mount sill plates at the construction site for assembling the wooden components. The measuring, levelling and mounting of these sill plates on the concreted basement is time-consuming. The sill plates are much easier to mount on a flat basement ceiling made of timber.

Timbase AG creates the basement with and up to the ceiling as a general contractor.



4 The walls in the basement are made of cross-laminated timber panels.



5 The cross-laminated timber panel above the basement acts as a floor slab.

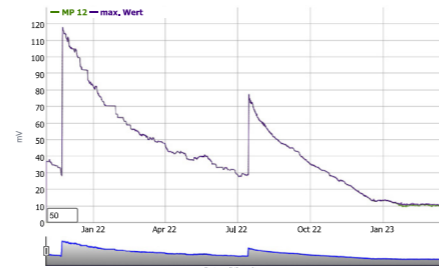
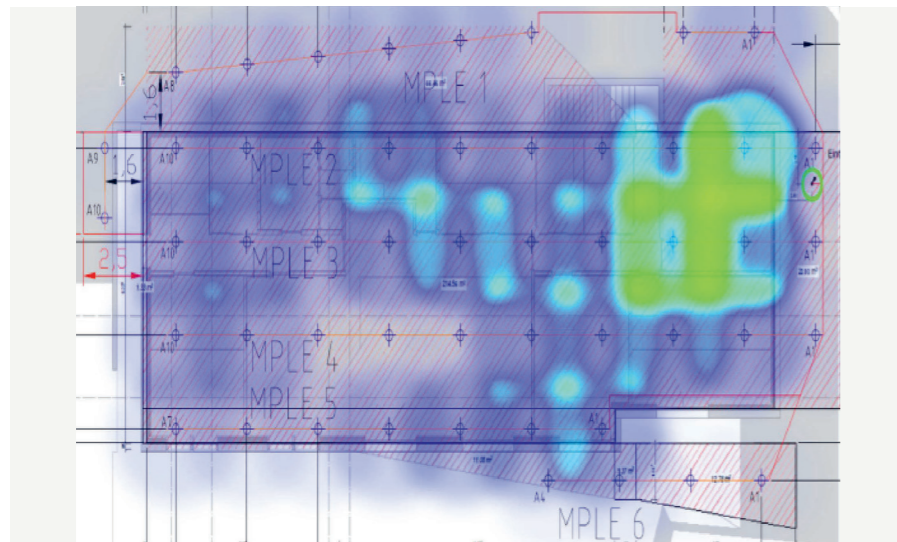


6 The timber construction is then erected on top of this as usual.



Still a few questions to clarify

Before cellars can be mass-produced using timber, there are a number of questions that first need to be answered. A research project is currently being carried out at Bern University of Applied Sciences to do just that.



After the water leaked from the ventilation system and the washing machine, the humidity rose abruptly and dried out again: Moisture monitoring measures the humidity between the individual measuring points (blue crosshairs).

The first timber basement in Switzerland was created in Thun. The project was able to benefit from insights into waterproofing technology gained from the construction of flat roofs and ponds. BFH researchers are accompanying the pilot project to examine and document the concept and to modify the system based on their observations.

Course of action

The analyses performed in the context of the pilot project are supplying key parameters needed for a numerical representation of the physical processes involved in construction. This provides a scientific basis for optimising the system and extending the warranty period. Laboratory and field tests are still needed to determine the static behaviour of the various materials in relation to each other.

Outlook

The choice of construction method and the application of waterproofing help prevent any penetration of moisture into the timber components. Through the combined experience of the business partners and the BFH researchers, the system basements in timber will be market-ready with a customary system guarantee for prefabricated basements.

Research institute
Bern University of Applied Sciences



Research partners:
Waterproofing
Contec AG



Glued laminated timber
Schilliger Holz AG



Large areas in timber
Timber Structures 3.0 AG



Timber construction engineer
Timbatec Holzbauingenieure AG



Flat roof construction
Gyger Flachdachbau AG



Timber construction
Stuberholz AG



Partner
Staudenschreiner GmbH



Moisture monitoring
Progeo AG



“Objectively, there are no arguments against using timber below ground”

Professor Christoph Renfer from Bern University of Applied Sciences is in charge of a research project which closely examines various approaches to the concept of timber basements.



Prof. Christoph Renfer is a professor for fire protection and timber construction as well as Head of Fire Safety and Building Physics at Bern University of Applied Sciences (BFH).

Christoph Renfer, the BFH is supervising the pilot project “Timber Basements” as research partner as part of a project by Innosuisse. What exactly does your research involve?

The goal of our project is to present scientific proof for this building system and to guarantee a minimum lifespan of 100 years, which is expected on the market nowadays for a basement. For this, we are currently closely monitoring the wooden basement already built in Thun. Our monitoring covers the interior of the basement, the timber walls as well as the surrounding soil. We measure the temperature and humidity. Based on this data, we can predict how these parameters within the building system will behave in years to come.

A surrounding waterproof membrane prevents water getting into the timber construction from outside. What happens if the construction gets wet nonetheless?

This issue is also part of our research project. On the one hand, we measure how much humidity the system can take before things get critical. On the other hand, we are working on

a solution for repairing the timber walls and the waterproof membrane from the inside. At the same time, all measures to prevent dampness from the inside are also being investigated.

What else has to be taken into consideration when building a timber basement?

A basement made of timber is much lighter than one made of steel and concrete. The lower mass brings its own challenges and our job is to find the appropriate solutions. For one, we have to ensure that the building does not float if it happens to end up standing in water. And there is the factor of earth pressure, of course, especially if the house is not surrounded on all sides by soil and theoretically could be pushed down the slope.

What excites you personally about the project?

Timber buildings can be very resistant, as constructions from all over the world show. But usually the wood is either completely in water or completely out of it in these cases. In a basement, the conditions are somewhere in between. With a timber basement, we are

breaking new ground and are doing what no one else in Switzerland has done before. Objectively, there are no arguments against using timber below ground. Even a basement in solid construction needs a waterproof membrane in order to ensure it is completely resistant to water. The longer I thought about it, the more obvious this became.

So what happens next?

There is a lot of interest for basements made of timber. We keep receiving enquiries and the demand for other uses, such as underground car parks in timber, is increasing too. However, our research project – which will continue until April 2023 – focuses exclusively on timber basements used as workspaces, storage rooms and living space. One aspect we will be taking a closer look at is insulation. Timber provides much better insulation than concrete, so it is obvious that the timber construction requires less insulation, resulting in material savings.

Service from a single source

When planning basements, we work in close cooperation with the engineers from our sister companies Timbatec and TS3 as well as selected partner companies. See for yourself how a basement would be a good foundation for your timber construction project. We offer an all-round package from a single source.



Planning

Timbase plans the entire basement with the load-bearing components. Fixtures such as through-passages or windows are expertly solved with proven details and coordinated with the respective trades.



Manufacture & delivery

Timbase organises and controls the manufacture and the delivery of all components for a timber basement. Timbase works together closely with your trusted partner.



Coordination

Timbase coordinates the cooperation and the timing of the construction process with all the contractors involved. The site management and the building owner thus have one contact person.



Guarantee

Timbase guarantees the durability of the basement and the services rendered. We check the watertightness at all times with the built-in monitoring system.



Construction supervision

Timbase manages and controls the assembly of the basement. The timber construction company and other sub-contractors provide manpower and, if necessary, work equipment.



“Would you like to build a timber basement? Then get in touch with us. We would be happy to help.”

Richard Wüthrich

Project Lead, Timber Construction Technician HF
+41 58 255 42 83
richard.wuethrich@tibase.com



Timbase AG

Niesenstrasse 1
3600 Thun
+41 58 255 42 80
info@tibase.ch