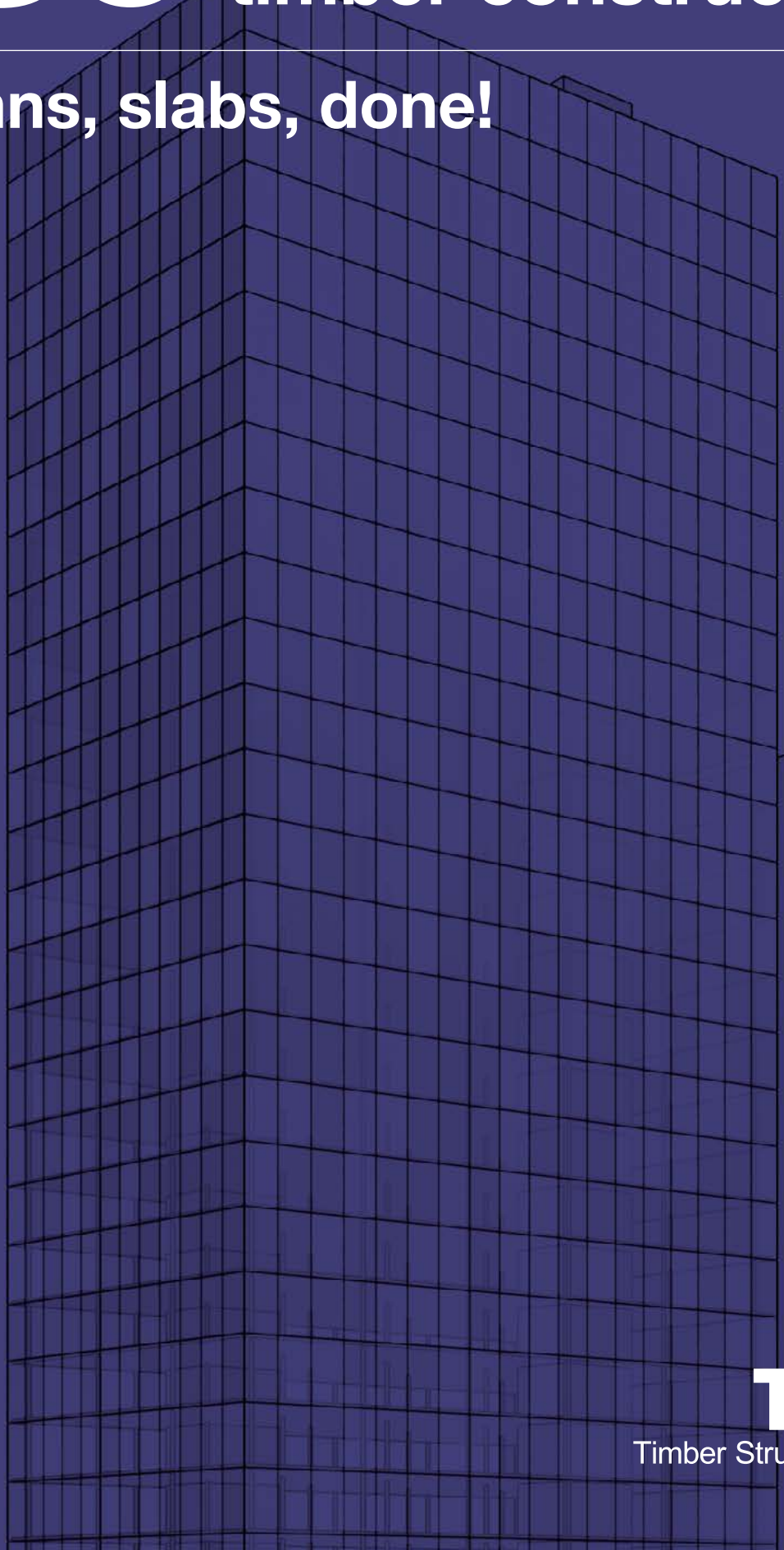
TS3 For large-scale timber construction

Columns, slabs, done!



TS3
Timber Structures 3.0

TS3 – fast, environment-friendly construction.

TS3 is the solution for large-scale timber construction and for column spacings in grids of up to eight by eight metres. It means wood can now be used for large buildings and extraordinary architecture. TS3 is the next generation of timber construction.

It took over ten years of research with the Federal Institute of Technology in Zurich and the Bern University of Applied Sciences to find the solution: a rigid, bend-resistant jointing of cross-laminated timber slabs using pouring to solid. This allows the construction of joist-free timber-frame structures with slender, point-supported slabs.

TS3 AG holds the patent for this technology and will be delighted to support you in your next construction project. We work with you from the first draft to liquid jointing on the construction site. Come on in. See for yourself how TS3 is the perfect choice for your timber construction project.

The wonders of wood

Timber construction is booming. This is attested to by wooden structures such as apartment buildings of more than 300 units, commercial and industrial buildings, administrative buildings, hotels and high-rise buildings. Behind the steady increase lie timber's numerous benefits.

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Sustainability. The importance of protecting the climate is now no longer a matter of debate, and wood forms part of the solution: as a renewable raw material, one cubic metre of wood removes about a ton of CO_2 from the atmosphere. Manufacturing one cubic metre of reinforced concrete, on the other hand, produces around 500 kilograms of CO_2. If you want to help protect the climate today, you build with wood.

Construction time. Timber buildings aren't just good for the climate, they're good for investors, too. Components are prefabricated to the millimetre and transported to the construction site to precise schedules. As a result, timber buildings are completed much faster than other construction projects, making them more economical.

Comfort. Wood has a higher surface temperature than concrete, steel or glass. Because of this, we feel more comfortable in wooden buildings, even if the room temperature is around 2°C lower. Which is good for the environment and for utility bills.

Soundproofing. Sound insulation, too, is not a problem in modern timber buildings. Houses made of wood in which you hear what's going on next door are a thing of the past. Modern wooden buildings easily meet sound insulation requirements.

Fire resistance. Today's timber construction meets the same fire safety standards as reinforced concrete buildings. A significant advantage is that wood burns predictably and retains its load-bearing capacity for a long time thanks to the protective layer of charcoal.

Lightweight. Wood is a lightweight building material, making it ideal for adding floors – that is to say, extensive living space – to existing buildings.

Durability. Installed dry and kept dry, wood lasts for generations. Wind and weather give ageing wood its patina without weakening it.

Value for money. Thanks to the above benefits, a wooden building may even be more economical than a solid building measured over its full life cycle.

1+2 **Handl Gastro Genusswelt, Pians**

3 + 4 **Generation House W52, Zurich**

5 **Pavilion Lokstadt, Winterthur**

Large beams interfere with the installation of building services.

Timber construction challenges …

Modern timber construction already allows for large, effective structures. But wood is only load-bearing in the direction in which the original tree grew. And civil engineers still often rely on a combination of wood, steel and concrete.

Uniaxial load bearing
One difficulty in timber construction is uniaxial load bearing. Wood only bears load in one direction, from wall to wall or from one column to the next. This requires the use of transverse beams, called joists. With TS3, large rooms with multiaxial load bearing can be created without the use of joists.

Building services
Building services are usually installed at the joist level and must pass through each beam. Since TS3 slabs don't require joists, installations can be freely routed – just as with reinforced concrete slabs. This allows for flexible retrofitting of building services.

Joists
If conventional timber construction is to avoid using joists, column grids with tight spacing are required. This is because the process of transportation limits the maximum possible dimensions of components, inhibiting flexibility in the building's use. With TS3, buildings can be constructed on 8 × 8 m column grids.

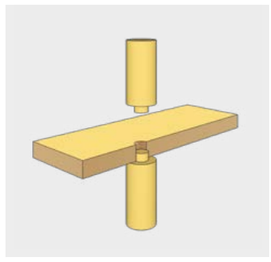
Wood, steel and concrete combinations
Even today, timber construction often uses materials with harmful environmental impacts, such as steel beams or layers of concrete, in an attempt to achieve shallow ceilings. With TS3, steel and concrete can be dispensed with and ballast provided using a cement-free, elastically bound chippings fill.

… solved with TS3.

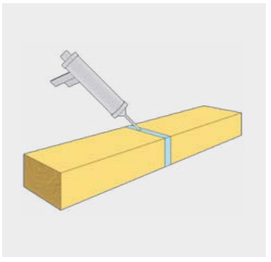
TS3 is the first biaxially load-bearing construction system made of wood. This allows ceilings to be built without interfering beams and load-bearing interior walls.

The core technologies are the column heads and the end-to-end liquid jointing of the wooden components. Both are the result of multiple research projects with the Bern University of Applied Sciences and the Federal Institute of Technology in Zurich. The cost of this system is comparable to that of a reinforced concrete ceiling.

Wood instead of concrete. It's that simple.
Timber Structures 3.0, TS3 for short, is a new building system for the global market. It makes possible skeleton frame structures of point-supported flat slabs, hitherto only familiar as reinforced concrete structures, but now made of wood.



New column head for wide spacing
In order to transfer heavy loads to the columns, TS3 has developed a special column head. In tests, breaking loads of 1100 to 3100 kilonewtons were achieved, depending on slab thickness and structure.



PTS (pouring to solid) – joining slabs end-to-end
TS3's core technology is end-to-end liquid jointing in gaps, using no pressing or other fasteners. This allows the production of slabs of any size.

Quality assurance processes
A comprehensive quality-assurance system has been developed to ensure the structural safety and serviceability of the TS3 joints, traceable at any time.

Planning using FEM software
TS3 structures are designed by engineers using FEM software. Our e-learning courses share this know-how with you. Producing structural designs for a TS3 project is easier and faster than for a classic timber construction.

The TS3 long-term test bed at the Bern University of Applied Sciences has provided key findings for the successful development of TS3 technology.

ETH Zurich and University of Applied Sciences collaboration

The TS3 technologies are the result of more than ten years of research by Timbatec Holzbauingenieure together with the Federal Institute of Technology in Zurich and the Bern University of Applied Sciences AHB. These technologies open up new markets for timber construction.

In 2009, Timbatec AG faced the same issue in three competitions: clients were interested in timber construction, but wanted large payloads and flexible options for usage. The team laboured over wood-clad steel and concrete solutions, but the work had little to do with timber construction and they didn't enjoy it. This experience, and the conviction that timber construction can make a major contribution to climate protection, is what drives us to search for new solutions. It had to be possible to construct large buildings, too, entirely from wood! Development of TS3 has been ongoing ever since.

Multiple research projects were conducted at the Bern University of Applied Sciences AHB in Biel and at the Federal Institute of Technology in Zurich, testing different bonding materials. Initial tests showed clearly that with TS3 technologies, even butt-jointed slabs can bear load. This was the breakthrough!

Our research and development partners since 2010

Timbatec Timber and Technology · ETH zürich · Berner Fachhochschule Architektur, Holz und Bau · SCHILLIGER HOLZ www.schilliger.ch · Henkel

TS3 takes timber construction to the next level

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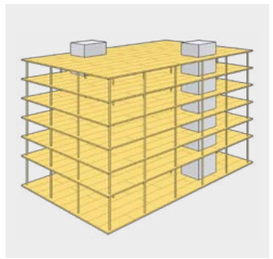
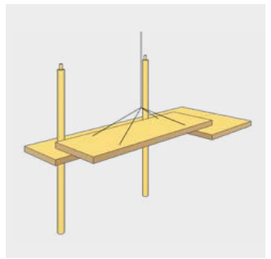
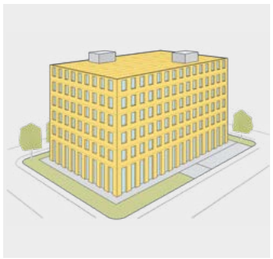


Timber skeleton construction
The large column grid makes TS3 a genuine alternative to concrete – for residential, industrial or public buildings.

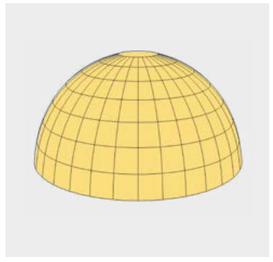
High-rise buildings
Thanks to vertical load transfer through the columns, TS3 is the ideal construction method for high-rise timber buildings.



8×8 metre column grid
With TS3, slabs bear load in two directions, spanning columns in an 8×8 metre grid.



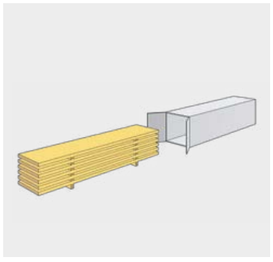
Flexibility of use
Structural changes are easier to implement than for concrete or conventional wooden buildings.



Freeform structures
If you're looking for design flexibility, TS3 is the right choice. It opens up completely new architectural possibilities.

Climate-friendly and local
Production is more environment-friendly than concrete: wood stores CO_2, it grows nearby, and transport routes are short.

Speed of construction
Wooden buildings do not need a drying period, as concrete buildings commonly do. This means quicker returns on investment.

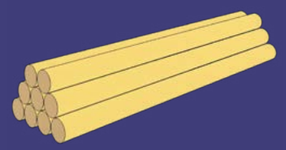


Lighter and space-saving
The thinness of TS3 slabs makes them space-saving. TS3 is also lightweight and perfect for additional storeys.

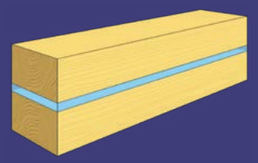
TS3 – the third generation of timber construction

With TS3, the third generation of timber construction has arrived. TS3 technologies are the greatest revolution in timber construction since the invention of glulam and cross-laminated timber.

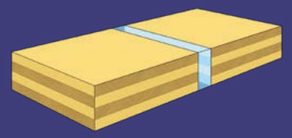
First generation
Timber structures 1.0 – beginnings of timber construction
In the first generation of timber construction, trees were felled and debarked after removing the branches, and buildings were erected using logs or sawn timber.



Second generation
Timber structures 2.0 – familiar technology
For centuries, trees have been sawn into boards, dried, planed and glued into glulam and cross-laminated timber. This creates large panels or beams that are longer than the trees are tall. This is the cornerstone of the success of timber construction.



Third generation
Timber structures 3.0 – the future of timber construction
TS3 joins wooden elements end-to-end. This enables the production of slabs of any size. Beams are no longer necessary thanks to high-tech column heads. It's a revolution in construction.
Try TS3 for yourself!



From stilt houses to skyscrapers
Ever since prehistoric stilt houses, wood has been used as a building material. For this first generation of timber construction, trees and beams made of solid wood were used. In the 20th century, the second generation of timber construction followed: innovative woodworkers bonded the wood into glulam and cross-laminated timber. These wood products are now common and make modern timber construction possible.
Nevertheless, concrete construction retained a distinctive advantage: it allowed structural elements which were capable of bearing load in multiple directions to be made – floor slabs, for example. Second-generation timber construction was not yet able to do that. This obstacle has now been removed. Timber construction with TS3 is on a par with reinforced concrete, even for large load-bearing areas.

Climate-friendly and quickly built
With TS3 technology, wood can replace reinforced concrete in most areas. This makes sense to do, because reinforced concrete has one hefty disadvantage: the production of steel and cement for the elements of reinforced concrete is energy-intensive and releases large amounts of CO_2. Globally, reinforced concrete is responsible for around nine percent of human CO_2 emissions. Wood, on the other hand, stores CO_2 – even once installed. If you want to help protect the climate today, you build with wood. TS3 makes eliminating steel and concrete possible in all types of buildings.

Our vision:
High-rise buildings built with TS3 technology.

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