Timber and Technology

Engineered timber structures

Timbatec
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Today, engineered timber structures can achieve spans and shapes that would have been unthinkable just a few years ago. Precise manufacturing, high-performance connections and innovative materials have made wood the preferred choice of building material for complex structures, ranging from large-scale space frames to 60-metre bridges. In this magazine, we explore our focus topic, Engineered timber structures, through completed projects.

1 East building, School Wiesental, Baar

2 Canopy PD/ID-Stand, Barracks Chamblon

3 Strohboid Glamping Lounge, Mountain Chalet

4 Timber construction assembly, School Ort, Au-Wädenswil

5 High-tech timber frame construction installation, School Nägelimoos, Kloten

6 Raiffeisen-Arena Patinoire Porrentruy

Photos:
1 © Photo: Andreas Busslinger busslinger.photography
2 © Photo: sury hilfiker hilmedia_design
3 © Photo: Strohboid
4 © Photo: Beat Bühler photography
5. © Photo: Jeffrey Schmid Timbatec
6. © Photo: Nils Sandmeier

Cover image: Primary truss, School Wiesental, Baar
© Photo: Andreas Busslinger busslinger.photography

**Dear partners and customers,
dear timber construction enthusiasts!**

Over the last 10 to 15 years, engineered timber structures have made enormous progress. The motto is higher, wider, further. At the same time, connection options have become increasingly efficient. Today, precise, automated systems ensure that traditional wood-to-wood connections can be used cost-effectively once again. Thanks to modern joinery systems, the dovetail joint, once displaced, has made a comeback and is now an integral part of many applications once again.

A multitude of technological developments are opening up entirely new dimensions in timber construction. One impressive example is the 60-metre-long Biberlikopf wildlife overpass, which will soon span the A3 motorway in the north of the canton of Glarus, Switzerland. Another example is the Wiesental school in Baar, where a large space frame spans the triple gym and supporting two floors of school, recreation, and community rooms.

High-performance materials such as laminated veneer lumber and large-format cross-laminated timber panels have become firmly established. These materials can be used to construct 2.5 x 20 metre ceilings or to build high-performance solid wood walls for multi-storey buildings. The high degree of prefabrication in timber construction significantly reduces construction time, which is a major advantage, particularly in urban areas where densification is required. Visible timber surfaces can now be incorporated directly into interior design in compliance with fire safety regulations. These surfaces give interiors their own character, eliminating the need for additional layers. Timber has also reached new design heights. The construction of the Biberlikopf wildlife bridge in its current form was made possible by the technical feasibility of individually curved glulam beams up to 30 metres in length. The structure can therefore follow the optimal flow of forces, making efficient use of the material's strength. Architecturally, membrane and surface structures can also be realised effectively, as demonstrated by the ‘Glamping Lounge’ project.

Photo: Visualisierung Nightnurse Images, Zürich

In timber construction, joints are the key. Engineers use their creativity to select the right joint for every situation. In the new school building in Ort in Au-Wädenswil, traditional wood-to-wood connections in the form of shear connectors in the Vierendeel girders experienced a renaissance. Timber construction is on the move – new ideas are constantly emerging that are shaping its future. But not all questions have been answered yet. Together with universities and research institutes, we are continuing to explore the potential of timber construction so that we can make even better use of it.

Let yourself be inspired and excited by the opportunities offered by engineered timber structures. We hope you enjoy reading this brochure.

Photo: Timbatec | nilssandmeier.com

Silvan Winterberg
Branch Manager,
Lucerne Office,
Head of Structural
Engineering in Timber,
BIM/IT Specialist

High-tech trusses for sports halls

Two locations, two sports halls and two tales of engineering excellence: ‘Nägelimoos’ and ‘Wiesental’ show that well-designed trusses can do more than create supporting structures, but also shape spaces that are technically and architecturally unique.

© Photo: Timbatec

Sports hall Nägelimoos, Kloten
The sports hall in the Nägelimoos project boasts impressive trusses that provide a robust supporting structure and architectural flair. They are made from Beech block-glued beams (BauBuche) and spruce glulam. They are connected at the nodes using glued-in threaded rods. Thanks to the effective teamwork of the timber construction service providers, the beams were planned, manufactured, transported and installed on site with great precision. As a subcontractor to Implenia Schweiz AG, Timbatec coordinated the extensive work planning. A large number of connection details, assembly plans, and loading plans were developed by the team in accordance with the specifications provided by the project engineers at Makiol Wiederkehr AG This resulted in a solution that was both technically and architecturally impressive.

© Photo: Makiol Wiederkehr AG

Two-storey spanned triple gym

Mega truss system for gym Wiesental, Baar
The particular challenge in this project was the 35-metre span of the triple gym. To efficiently distribute loads and minimise deformation, a mega truss spanning two floors was used. The targeted combination of wood and steel enabled the structural requirements to be met while adding architectural accents. This impressive combination of materials demonstrates how it can unite technical, functional and design requirements.

Report here

Photo: Korst Holzbau AG

Photo: Timbatec | milissandmeier.com

Alois Räber
Timber Engineer,
Timbatec

«A great example of the combination of architectural ambition and engineering excellence in timber construction.»

Vierendeel girders in timber

The new school complex in Wädenswil-Au demonstrates the advances in timber construction: a school building constructed entirely of timber has been built above a triple sports hall. This was made possible by the use of specially developed Vierendeel girders with shear connectors and a cambered design, which provide maximum structural performance while allowing architectural openness.

© Photo: Mario Wagen

The project:
This engineering structure was built in the Au district of Wädenswil. In the new extension to Ort Primary School, wood has been used to create structural and aesthetic accents. A supporting structure comprising Vierendeel girders was developed in collaboration with the Zurich-based architectural firm horisberger wagen architekten gmbh. Five room-height beams span the triple sports hall, defining the spatial structure of the floor above, which is used for lessons. The use of wooden Vierendeel girders demonstrates that high static requirements can consistently be met in timber construction.

Main structure
- 5 Vierendeel girders: 38 m long, consisting of glulam beams and CLT shear panels

Timber quantities

• Solid structural timber C24	70 m³
• GL24 invisible	108 m³
• GL24h visible	347 m³
• GL24h beam layer	333 m³
Total timber members	858 m³

• OSB	25 m³ | 1054 m²
• Kerto Q	37 m³ | 673 m²
• CLT	214 m³ | 1883 m²
• 3 Ply panel	79 m³ | 2485 m²
Total plate products	355 m³ | 6095 m²

Building costs
- Building cost plan code 214 CHF 3.5 Mio.
- Overall project CHF 23.4 Mio.

Photo: Beat Bühler photography

Five Vierendeel girders with double spans of 28 m and 10 m span across the triple sports hall, foyer and classrooms

Building owner
Stadt Wädenswil

General planner consortium
horisberger wagen architekten gmbh, Zürich
sonderegger baurealisation ag, Rüti

Architecture
horisberger wagen architekten gmbh, Zürich

Building management
sonderegger baurealisation ag, Rüti

Civil engineer
Büeler Fischli Bauingenieure AG, Zürich
(ehemals Aerni & Aerni Ingenieure AG)

Timber engineer and fire safety
Timbatec Holzbauingenieure (Schweiz) AG, Zürich

Timber construction
Egli Zimmerei AG, Oberhelfenschwil

Timber members/GL beams
Upper and lower chords
Hüsser Holzleimbau AG, Bremgarten

Vierendeel girders in timber construction
The Vierendeel girder, named after its inventor, Arthur Vierendeel, is known in steel construction, but it also offers possibilities in timber construction. So, what makes it so special?

- No diagonal struts: Generous, diagonal-free beam openings are possible – perfect for clean, architectural lines.
- Rigid connections: Instead of diagonal struts, load-bearing capacity is achieved here via shear and tension connections.
- Aesthetics and function: static requirements can be ideally combined with creative freedom here – perfect for modern façades.
- The challenge in timber construction is the connection between the selected load-bearing layers in order to ensure shear strength.

Photo: Mario Wagen

«We designed a structure with wooden Vierendeel girders – tailored for this project.»

Mario Wagen, Architect FH
Company owner, horisberger wagen architekten gmbh, Zürich

Photo: Timbatec | niklasandmeier.com

«The CLT panel is under considerable stress in some places – it is subject to the highest loads and, when tapped while installed, sounds almost like a stretched guitar string, which is an audible indication of the high shear forces to which it is being subjected.»

Phil Fehse
Timber Engineer, Timbatec

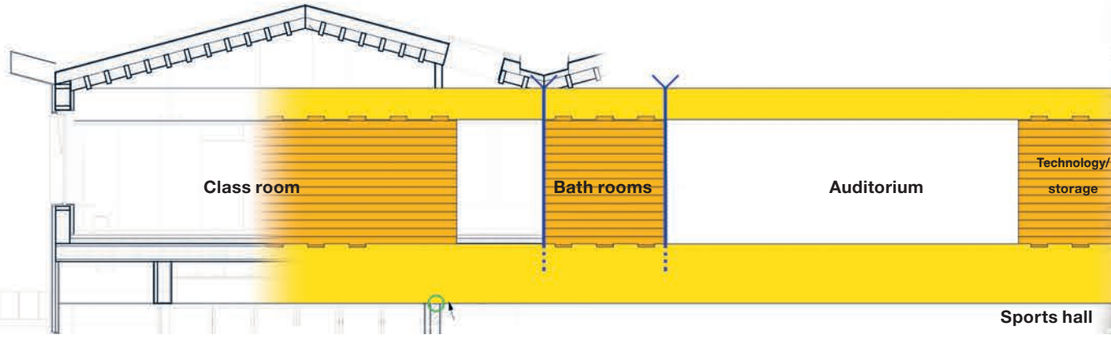
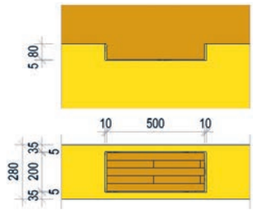


Photo: Beat Bühler photography



Detail of the shear connector on the Vierendeel girder between the glulam lower chord and the CLT panel.

Cross-section of the Vierendeel girder with upper and lower chords. The structure is held together with tie rods to absorb tensile forces

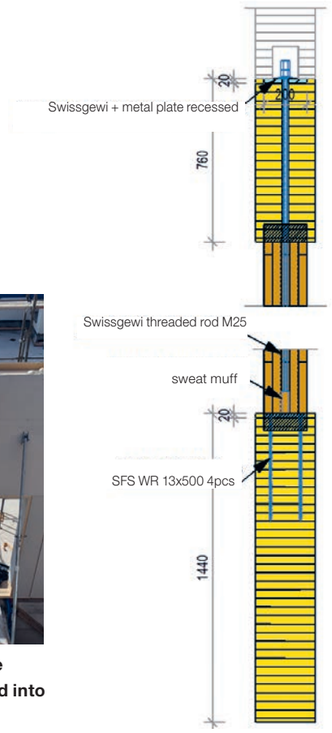
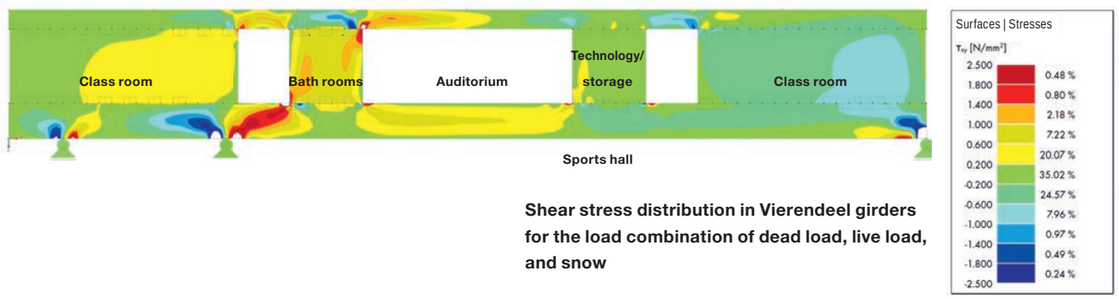


Photo: Beat Bühler photography

The pockets for holding the shear connectors are milled into the upper and lower belts.

Static model

Cambered Beam Structure – Where Span Meets Precision
One of the key solutions lies in the design of the camber – a method that has proven itself in timber engineering, but is rarely used in timber construction on this scale. The supporting structure was designed with a camber of up to nine centimetres. These are calculated in such a way that the ceiling levels itself under its own weight and after the slabs has been installed, creating a level usable area for the classrooms. The static efficiency of this construction lies in the precise calculation of the expected deflection.



Shear stress distribution in Vierendeel girders for the load combination of dead load, live load, and snow

Small shear connector - big impact
Extensive testing has ensured that the shear connector are an innovation with a future.

Innovation from research and practice
At the heart of the Vierendeel girder are shear connectors cut directly from the CLT walls. These transfer shear forces between the upper and lower chords, ensuring the system is highly rigid. This connection is not only form-fitting and durable, but also highly efficient. The load-bearing capacity of this construction was impressively demonstrated at ETH Zurich. A single connector can transfer shear forces of up to 30 tonnes.

The research findings were incorporated directly into the planning and implementation of the Vierendeel girders for the new building. The combination of practical research, material-appropriate design, and state-of-the-art manufacturing technology demonstrates the significant potential of timber construction, particularly for public buildings where size, ecological considerations, functionality, and aesthetics converge.

Findings from the experimental tests
- The connection behaves almost linearly elastic - ideal plastic.
- Reaching the compressive strength of the CLT connector is the decisive failure mode.
- The connection exhibits ductile behaviour as no brittle failure modes occur.
- The connection is very rigid without initial slip thanks to grouting.

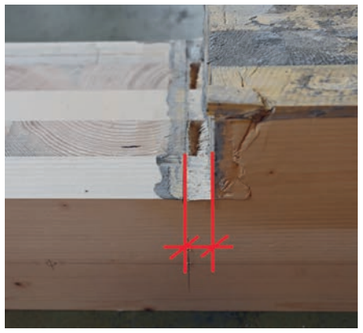
Photo: Timbatec | nilssandmeier.com

«A single connector can transfer up to 30 tonnes of shear force.»

Dr. Marcel Muster
Researcher and Lecture at ETH Zürich,
Timber Engineer, Timbatec

The test specimens were prepared in the carpentry workshop.

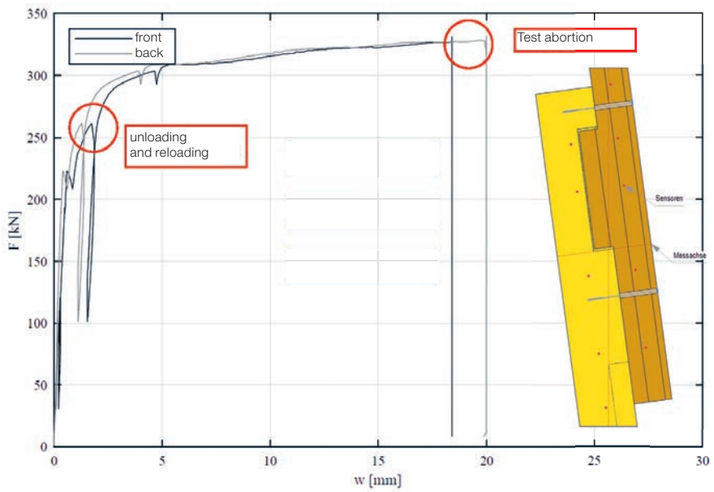
The pockets of the shear connector were filled with a cementitious compound.



Ductile behaviour of the CLT shear connector

A total of six specimens were tested in the ETH Zurich test laboratory.

Load-Displacement- Diagram



Raiffeisen Arena, Ice rink of the ice hockey club HC Ajoie

Top-class hockey in timber structure construction

Innovative technologies played a leading role in the construction of the new ice rink for the Ajoie Hockey Club in Porrentruy. Wood from the surrounding forests was used, and a hybrid construction combining different wood species was chosen to ensure the "right material was used in the right place".

Photo: Timbatec | nilssandmeier.com

Timber structure and stadium roof
The roof of the new ice rink at the Ajoie Hockey Club in Porrentruy is supported by a hybrid system made of hardwood and softwood. The lower and upper chords, as well as the diagonals, which bear the highest loads, are made of ash glulam. The other elements of the truss construction are made of softwood. Combining the two types of wood, which have different mechanical properties, resulted in a very slender supporting structure.

Grandstand and seating area
The recently erected grandstand spectator area was constructed entirely from wood. The central support system was realised with a primary structure. This structure was made of laminated beech timber. The secondary system consists of standardised softwood components. These components also enabled the construction of the steps required for the standing areas for fans. Above this is an additional grandstand with around 350 seats. The overhang is supported by tie rods installed in the façade and anchored in the foundation. This allows long-term control of deformations. These deformations are caused by the movements of spectators. Multi-layer panel walls in the support system provide the necessary rigidity to absorb the resulting vibrations. The resulting self-supporting timber construction ensures an unobstructed view of the ice rink, making it a great place to enjoy some winter sports.

Architecture
Dolci Architectes, 1400 Yverdon-les-Bains

Timber engineer
Timbatec Holzbauingenieure (Schweiz) AG
Bern, 3012 Bern

Timber construction
- Batipro SA, 2882 St-Ursanne
- JPF-Ducret SA, 1630 Bulle
- Thiévent & Gerber SA, 2905 Courtedoux
- A+C Corbat SA, 2943 Vendlincourt

Client
SidP, 2900 Porrentruy

Sustainable tent construction for extreme loads

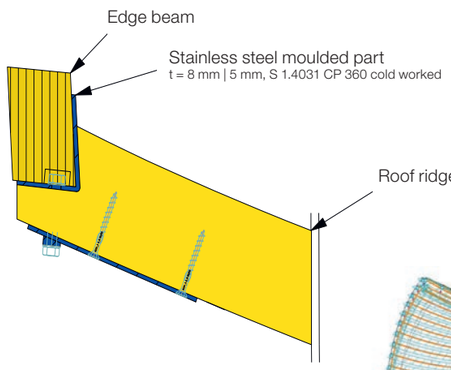
The Mountain Chalet is a tent-like structure made of boards and laminated veneer lumber. Its supporting structure is designed to sustain snow loads of up to 800 kg/m² and wind speeds of up to 170 km/h. Its shell forms a membrane with a wooden shingle roof on a wooden substructure.

The chalets' supporting structure consists of four differently curved glulam beams connected to glulam ridge beams with ventilation openings. Laminated veneer lumber panels stabilises the system in case of snow load. The curved beams were generated using isogeometric approximation functions (NURBS functions) to replicate the tent shape geometry and enable verification and optimisation of the cross-sections at every point. The structural analysis was carried out using a structural analysis programme.

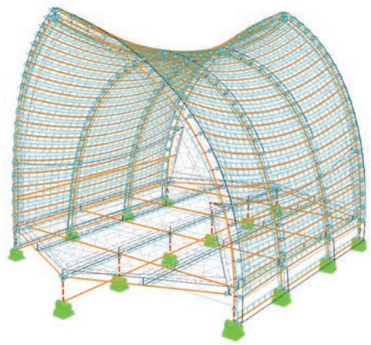
The floor slab is bolted to laminated veneer lumber beams, which rest on point foundations. The concrete foundations were designed so that the uplift verification requirements for different applications are always met by the dead weight. The envelope structure comprises a double-walled premium membrane, a wooden shingle roof, and a panoramic glass façade. In the model, all elements were simulated as hinged surfaces on the battens to verify the tent structure's overall rigidity.

Due to the increased requirements compared to the previous versions of the Strohboid Glamping series, improvements were also made to the connections. The option of a canopy was also included in the design, which was a welcome addition. All connections were developed to be easy to assemble and disassemble, making them simple to use. In addition, a heating load calculation was carried out for standard climatic conditions (Chalet Standard to -10°C) and for use in extreme climatic conditions (Chalet Nordic to -30°C).

© Photo: Strohboid



Detail
Edge beam / roof ridge beam



RFEM model

Building owner/Client
Strohboid

Architecture
Strohboid

Timber engineer
Timbatec Holzbauingenieure ZT GmbH, Wien

Building physics
Timbatec Holzbauingenieure ZT GmbH, Wien

Timber construction
Strohboid

Engineering expertise with TS3

The remarkable angled and folding roof in Chamblon shows that technical innovation and architectural expression go hand in hand – when planning, engineering and craftsmanship come together seamlessly.

Atelier d'architecture Charrière-Partenaires SA won the competition to design the extension to the barracks in Chamblon, with their design featuring a folded roof. Timbatec Holzbauingenieure Schweiz AG and Vial Charpente then jointly developed a solution for constructing the 216 m² roof area using 280 mm-thick CLT panels and TS3 technology.

Photo: sury hilfiker hilmedia_design

Divided into six segments, the roof was prefabricated with millimetre precision on a negative mould with TS3 joints in the workshop. Since the TS3 angle connections only achieve the correct load-bearing effect within the complete folded structure, the entire roof was assembled on the ground on site. A total of 124 metres of TS3 joints were used for this purpose. Finally, the 30-tonne roof was attached to two beams, lifted up by crane and placed on ten V-shaped steel supports. This impressive project demonstrates how modern timber construction can combine design freedom with technical precision.

Timber Structures 3.0 (TS3) is part of the Timbagroup, a group of companies aiming to increase the market share of timber construction in the building industry.

TS3
Timber Structures 3.0

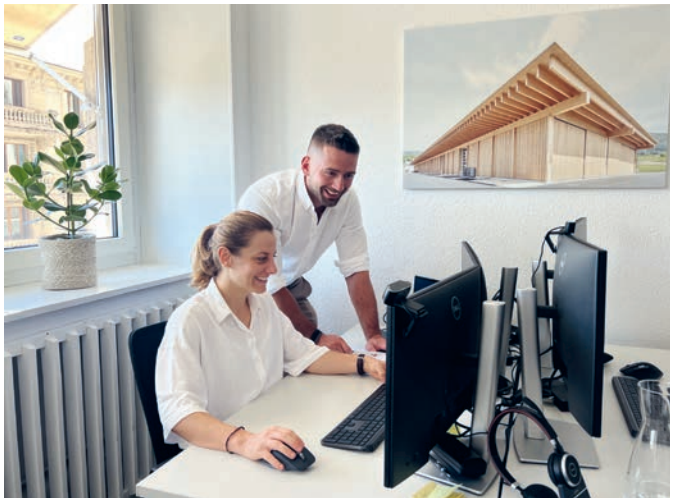
New offices have opened in Lausanne and Hamburg

On site for you

Since September 2025, we have been even closer to our customers with two new offices: one in Lausanne, to strengthen our presence in western Switzerland, and one in Hamburg, to make our timber construction expertise available in Germany as well. Get to know our locations and teams.

Bienvenue à Lausanne!
Timbatec has also been represented in Lausanne since 1st September 2025, at Place de la Gare 12. Led by Simon Vuilleumier (timber construction engineer, BSc in Wood Technology) and supported by Laura Lips (graduate civil engineer, FH in Timber Construction), projects in French-speaking Switzerland are managed as closely as possible to the customer. The new location enables short response times and direct on-site communication.

Our local team in Lausanne



Moin, Moin Hamburg, here we are!
At the same time, Timbatec opened its office in Hamburg at Hegestraße 40 on 1st September 2025. Jari Janowski manages the office, combining Swiss timber construction expertise with German standards. The team has local market knowledge and experience in Eurocode-compliant structural design, statics, fire protection, building physics.

We make sure that your projects run smoothly, even internationally, by focusing on efficient processes and clear lines of responsibility.

Hamburg, here we are!

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Timbatec
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www.timbatec.com

printed in switzerland

Editorial : Lorenz Obrist Design: Barbara Bissig Editing and translation: ITimbatec Holzbauingenieure