

Timber-Carbon-Concrete-Composite bridge sets new standards

Balteschwiler AG uses a newly commissioned Technowood system to process large free form glued laminated timbers. A new timber-concrete-composite construction method in which carbon concrete replaces conventional steel reinforcement, is being used in the Baden-Württemberg capital Stuttgart for a 70m long foot and bicycle bridge over the "Seeblick" street between Mühlhausen and Bad Cannstatt. One challenge in the fabrication was the large dimensions of the two free form bridge components made of glued laminated timber beams. After initially, no joinery company was found, Balteschwiler AG, Laufenburg (Switzerland), was able to carry out the processing with its "TW-Concept-Line", which was newly commissioned in September.

A foray into the future of bridge building

It is the first bridge in Stuttgart to be constructed using a composite construction method made of wooden beams and carbon concrete (textile concrete), where carbon fiber mats replace steel reinforcement. The component thickness and the weight of the construction can be significantly reduced. In addition, no corrosion problems can occur, eliminating the need to seal the concrete. The two materials are optimally used in combination according to their properties: the wooden beams in the tension zone and the concrete slab in the compression zone and in the tension zone above the central support. To protect the wood from the weather, the concrete slab cast on site protrudes laterally over the beams. Due to the large dimensions of the glulam beams produced by Holzleimbau Wiedmann, Rheinfelden-Minself, each being 24 m long, 2.22 m wide, 0.7 m high and weighing almost 16 tons, it was a challenge to find a company at the beginning of the project that could process the beams.



The foot and bicycle bridge has two large free form components made of glued laminated timber, which were processed on the "TW-Concept-Line" that was newly installed at Balteschwiler AG in September. Photos: Harrer Ingenieure GmbH

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Thanks to the “TW-Concept-Line” carpentry machine, Balteschwiler was able to step in and take over production. Balteschwiler initially tested whether it was possible to join these free form components using 3D models, as the system itself was still in production at Technowood AG in Alt St. Johann (Switzerland). Using models created by Design-to-Production GmbH, Erlenbach (Switzerland), the machine data was created in “Lignocam” and the machining was carried out with high precision. The Technowood joinery system allows a maximum machinable size of straight components of 72 × 4.3 × 1.2 m. It is designed for processing cross-laminated timber and glued laminated timber elements, has two gantry robots, two turning devices and a longitudinal conveyor, and allows a five-axis free form machining.



High-tech protective layer and smart connections

To protect against moisture, dirt and UV radiation, the glulam beams were treated on all sides after joining with the product “Lignopro-BSH-Varnish”, a hydrophobic product manufactured by Koch and Schulte, Linden. A layer of epoxy resin sprinkled with sand was applied on the top of the beams to achieve a better bond with the concrete. A foil was attached to protect it during construction. Also in the Balteschwiler factory, the shear plates and the “Combar” dowels – a non-metallic composite material made of glass fibers and a vinyl ester resin – were glued in by the company Erne AG, Laufenburg (Switzerland). Prepared for the application of the concrete, the beams were transported by special transport to their location in Stuttgart. The bridge is expected to be completed by the second quarter of 2024.



Production Balteschwiler AG, Laufenburg

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Balteschwiler AG invests in new timber construction technology

“Balteschwiler AG sees itself as an extended workbench for its customers,” emphasizes CEO Jörg Langheim. While the demand for cross-laminated timber (CLT), particularly for multi-storey timber construction, and CLT production volumes are growing strongly, Balteschwiler is not seeing sufficient growth in joinery capacities on the market. That's why it was decided to invest CHF 8.5 million in the new Technowood carpentry system, which was put into operation after 15 months of planning and construction - just in time for the implementation of the Stuttgart bridge project. Balteschwiler offers other services beyond joinery, e.g. surface treatment of the panels, the prefabrication of wooden components and modules such as lift shafts and the organization of logistics. The company also operates a surface coating factory and offers terraces and wood protection systems. Founded in 1791 by Blasius Balteschwiler, Balteschwiler AG now employs around 100 people at its headquarters in Laufenburg in the canton of Aargau.
