



Elegantly connected

SOFiSTiK Bridge + Infrastructure Modeler, a tool that eases the challenging design of a pedestrian bridge for Basler & Hofmann engineering

The engineering, consulting and planning company Basler & Hofmann from Zurich, in collaboration with landscape architects DGJ Landscapes and Nau2 Architekten, won the project competition for the pedestrian link from St. Gallen's old town to the university district. The required BIM model was developed using Autodesk Revit. The SOFiSTiK Bridge + Infrastructure Modeler (SBIM) and Dynamo® a visual programming tool were used for modelling the footbridge. This set of programs allowed them to quickly create a multitude of variants. The model now provides the basis for project planning, including cost estimation, tender documentation and time scheduling.

St. Gallen, situated at an altitude of 700 metres, is a metropolis in eastern Switzerland. Home to the St. Gallen Cathedral and Abbey Library UNESCO World Heritage Sites, an important university location and much more. Structural changes must be approached thoughtfully here.

This also applies to the "Brücke über den Graben" project, a pedestrian connection from the old town. It leads past the extended UG25 multi-storey car park – a building from the 1950s – to the "Unterer Rosenberg" district. The protected St. Mangen Park, with the historic St. Mangen Church, is to be crossed and the busy cantonal road needs to be handled.

The client, Senn Resources AG, announced a competition for this project. Among other requirements a BIM model of the future solution was required. This model is used for further project planning.

A process with character

The solution developed by the Basler & Hofmann (engineering), DGJ Landscapes (landscape architecture) and Nau2 (architecture) competition team won over the jury. The slender, filigree construction maintains the effect of the ensemble of park and church. As the jury states, the project “picks up on theme of the English landscape garden and [will be] a tracking shot in space.”

BIM experience

The Basler & Hofmann project team brings a lot of BIM experience to the table. The engineering, planning and consulting company employs around 700 people from more than 30 disciplines in five countries (Switzerland, Germany, Italy, Slovakia and Singapore). The company develops ground-breaking solutions in the areas of construction, mobility, energy, safety and the environment. All in an advisory, planning and project management capacity. BIM is a method that they practised for several years.

The right tools

Although the client requested a BIM model, no detailed EIR (Employer's Information Requirements) were provided, the Basler & Hofmann project team decided to use the SOFiSTiK Bridge + Infrastructure Modeler® (SBIM) to complement their traditional tools such as Revit® and the Dynamo® visual programming language. SBIM was applied for the whole project for the first time.

“We had previously used SBIM for 3D modelling of axis-based components such as bridge superstructures, cable ducts or platform roofs, but never for a holistic BIM model of a complete bridge,” explains Seraina Buholzer, project engineer at Basler & Hofmann.

Hand in hand software solutions

Just as engineers, architects and landscape planners work closely together during the competition, so too do the software solutions used. A digital platform allows the exchange of data between the participating companies. The digital 3D model was set up in such a way, that it can be used not only for visualisation, but also for cost estimates, tender documentation and construction stage simulation.



In an elegant line from the multi-storey car park into the old town: the “Brücke über den Graben” connects the old and the new in St. Gallen. © Grischa Fischer, studiohometown



The possibility of capturing the trees with a 3D scanner and designing the line of the bridge accordingly with the model protects the old tree population. © Grischa Fischer, studiohometown

Small, elegant, complex

Even though the “Brücke über den Graben” project is not a huge structure, the challenges were enormous: there were the design aspects, where it was necessary to preserve the historical ambience and at the same time create a connection to modernity.

Additionally, there was preserving the protected trees in the park. The competition team had to find a route that passes between the trees without them suffering damage from the construction work.

3D scans & SOFiSTiK Bridge + Infrastructure Modeler

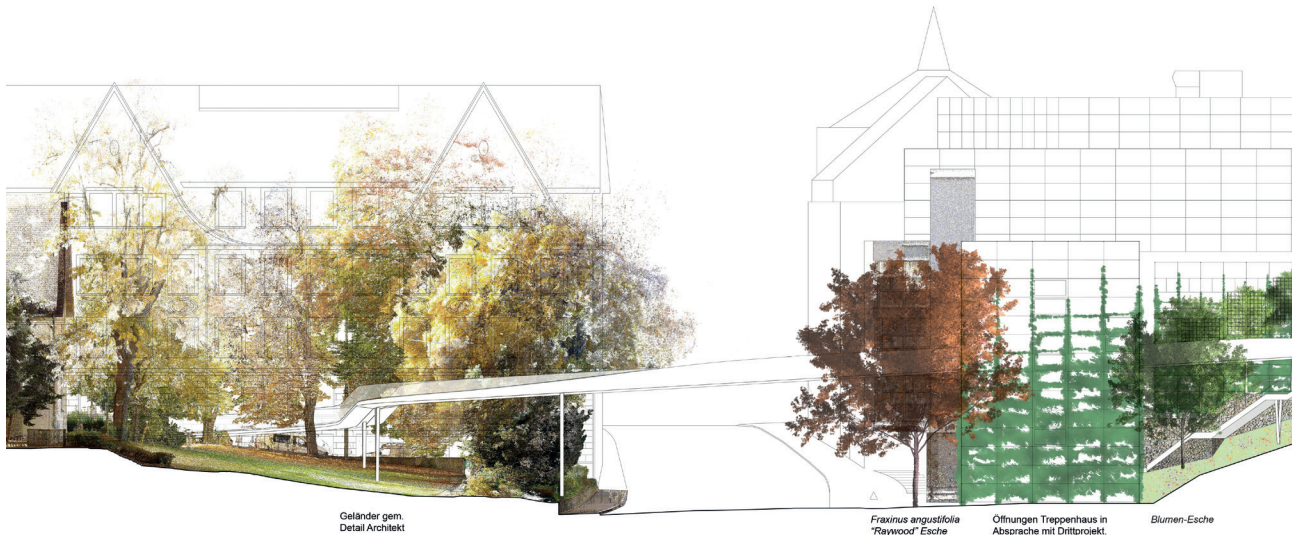
The trees were not only sketched for the planning, but also captured with a 3D scanner. These images or point clouds can be further processed in the 3D model. The course of the bridge was laid out in such a way, that it always kept a sufficient distance to the trees and that no branches vital to the tree were removed. The engineering team traced the course using the SOFiSTiK Bridge + Infrastructure Modeler and their own Dynamo® scripts. The bridge supports were modelled using parametric families in Autodesk® Revit® and quickly and conveniently placed along the axis using the placement function of SBIM.

How detailed is the modelling?

Deriving the impact on the construction cost from the model worked only to a certain extent. “This depends heavily on the modelling method of the components,” says Seraina Buholzer. Often, the entire superstructure is modelled in SBIM as a single volume. However, if you want to determine the quantity of individual components – roadway slab, ridges, railings, caps – separately for the mass extracts and cost estimates, they also must be modelled individually. For the competition designs, the less detailed modelling was sufficient. In the final planning, the project team must go into greater detail.

Making variants visible

In the competition and planning phase, the BIM model made it possible to visualise different variants. They were used to visualize variants regarding alignment, as well as profile design of the superstructure. The course and appearance of the footbridge could be checked in terms of its effect on the terrain. “This was very user-friendly,” explains Emmanuelle Sallin, another project engineer at Basler & Hofmann. “The client and project partners always knew exactly what the implications of their decisions would be.” The two engineers are confident that the positive experience will also continue into the execution phase.



Significant advantages were achieved by checking the design and implementing the planning process in a virtual 3D environment of the real tree population (3D point cloud scanning). © DGJ Landscapes



Enthusiastic about BIM and the SOFiSTiK Bridge + Infrastructure Modeler: **civil engineers Emmanuelle Sallin and Seraina Buholzer**, both project engineers at Basler & Hofmann.

„The SOFiSTiK Bridge + Infrastructure Modeler is very user-friendly and has made bridge modelling much easier.“



„The SBIM was a valuable tool for carrying out variant studies.“

Basler & Hofmann

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