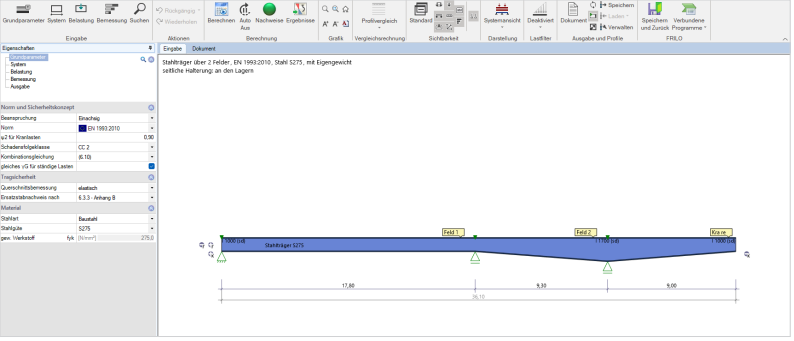
HEAVEN & HELL: FLOATING HOTEL ANNEX FOR HEAVENLY WELLNESS

Since mid-2022, the Alpin Panorama Hotel Hubertus has been attracting guests with a spectacular „floating" wellness area. The challenging structural design was successfully developed with ALLPLAN and FRILO.

Heaven and hell are generally considered unattainable for mere mortals in this world – and usually only access to one of the two is truly desirable. The Alpin Panorama Hotel Hubertus in Olang, South Tyrol, is changing these traditional principles with a wellness area that is both heavenly and hellishly good. „Heaven & Hell" is the name of the wellness concept that has been bringing heaven and hell to earth in a sensational annex since June 2022. Two worlds – one above and one „upside down" – are formed on the upper and lower sides of a platform that protrudes far from the hotel. The lower „hell," whose free-floating rooms appear upside down from the outside, seems no less enjoyable than its blissful counterpart on the upper floor. The design is by the Bolzano-based architectural collective NOA, which was also responsible for the hotel's spectacular sky pool in 2016. As before, IPM Engineering was responsible for the construction management, structural engineering, structural construction management, and safety coordination. The structural design was developed in-house using ALLPLAN and FRILO.



The primary supporting structure is a steel construction consisting of two solid 40-meter-long I-beams resting on two inclined supports. The platform is also bolted to the main beams using I-beams.

Village of cabins

The platform is located at a height of around 14 meters, where it protrudes about eleven meters from the main structure. The room layout in the upper part of the platform includes two whirlpools and panoramic showers as well as a changing room. Most of the approximately 140 square meter area is open-air, while small "cabins" with gabled roofs create sheltered indoor areas. On the lower level, these huts and their private area are more lavish, with a total of 65 square meters of usable space. A central foyer leads to two saunas, a shower cubicle, an ice mist bath, and a third outdoor pool.

The idea behind the wellness area is not actually that of a mythical or religious-spiritual dichotomy, but rather that of a village of huts. The fact that the latter are upside down on the lower level not only has an aesthetic wow effect, but also a simple pragmatic advantage: the inverted gabled roofs provide additional space for the pool's water treatment system and the seating steps of the saunas. Another factor that supports the heaven-hell metaphor is the noticeable temperature difference between the two areas. It becomes significantly warmer as you descend into "hell."

A hybrid structure made of concrete, steel, and wood

The main supporting structure is founded on concrete foundations that were built down to the bedrock. Where the bedrock could not be reached, steel bored piles were used. The primary supporting structure of the annex is also made up of steel

PROJECT INFORMATION AT A GLANCE

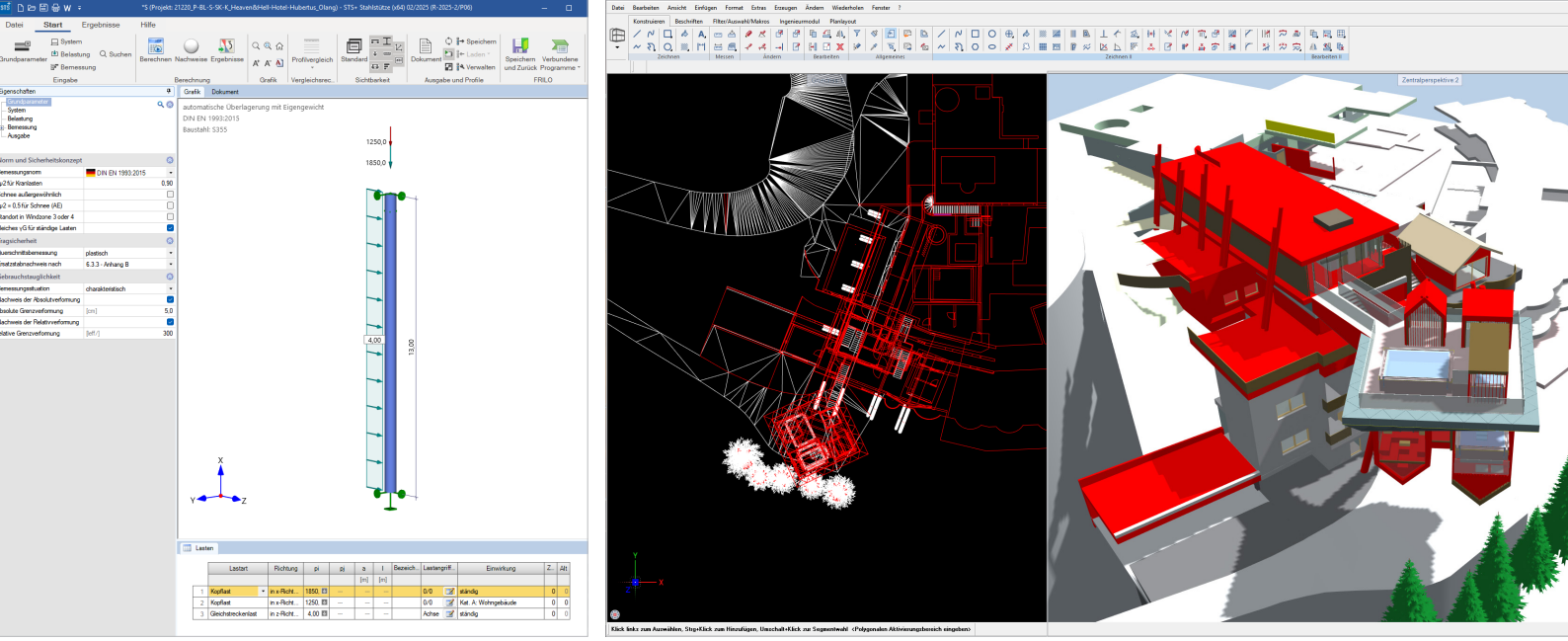
- **Focus:** Structural engineering
- **Software:** ALLPLAN, FRILO
- **Client:** Gasser Touristik GmbH
- **Architectural design:** NOA
- **Structural design:** iPM Engineering
- **Project start (planning):** September 2021
- **Project completion:** June 2022

construction: two massive 40-meter-long I-beams with maximum dimensions of 1.7 meters in height and 60 millimeters in wall thickness rest on two inclined steel supports made of steel tubes (Ro 508 x t = 35 mm). The supports are additionally clad with larch trunks, which gives them the appearance of tree trunks.

The platform is bolted to the main beams using I-beams. The inverted cabins were also suspended from the platform using a steel structure on the underside. The walkable platforms on both levels are designed as reinforced concrete composite slabs with load-bearing trapezoidal sheet metal as permanent formwork (h = 15 cm), while the pools required additional decoupled reinforced concrete slabs (also h = 15 cm). Cross-laminated timber panels were used to infill the walls.

Time pressure, challenging coordination, and heavy whirlpools

The planning phase was tight, leaving little lead time before construction began. Due to the load-bearing



Three heavy whirlpools with infinity overflow channels placed the highest demands on the limit deformations of the platform's steel structure.

structure made of concrete, steel, and wood, three different specialist construction companies (metalworkers, bricklayers, and carpenters) had to erect the supporting structure almost simultaneously during the construction phase, which required a high degree of coordination and clarity on site. The three whirlpools with infinity overflow channels also placed extremely strict demands on the platform's limit deformations (deflection, torsion).

Structural design with ALLPLAN and FRILO

IPM Engineering benefited from planning in ALLPLAN and FRILO in solving these challenges. ALLPLAN served as the working environment for the execution planning, the execution statics, and the safety plans. The component-by-component design of the load-bearing elements in steel, concrete, and wood (foundations, columns, beams, and bolted steel connections) was carried out in FRILO. In addition, further structural analysis software was used for 3D analysis of the overall load-bearing capacity and serviceability of the entire structure (including seismic verification, horizontal bracing, and FEM-based node details). Due to the tight timeframe and close collaboration with carpenters and metalworkers, data transfer between the project participants and their various planning programs was primarily carried out using DWG. An Open BIM process was not used.

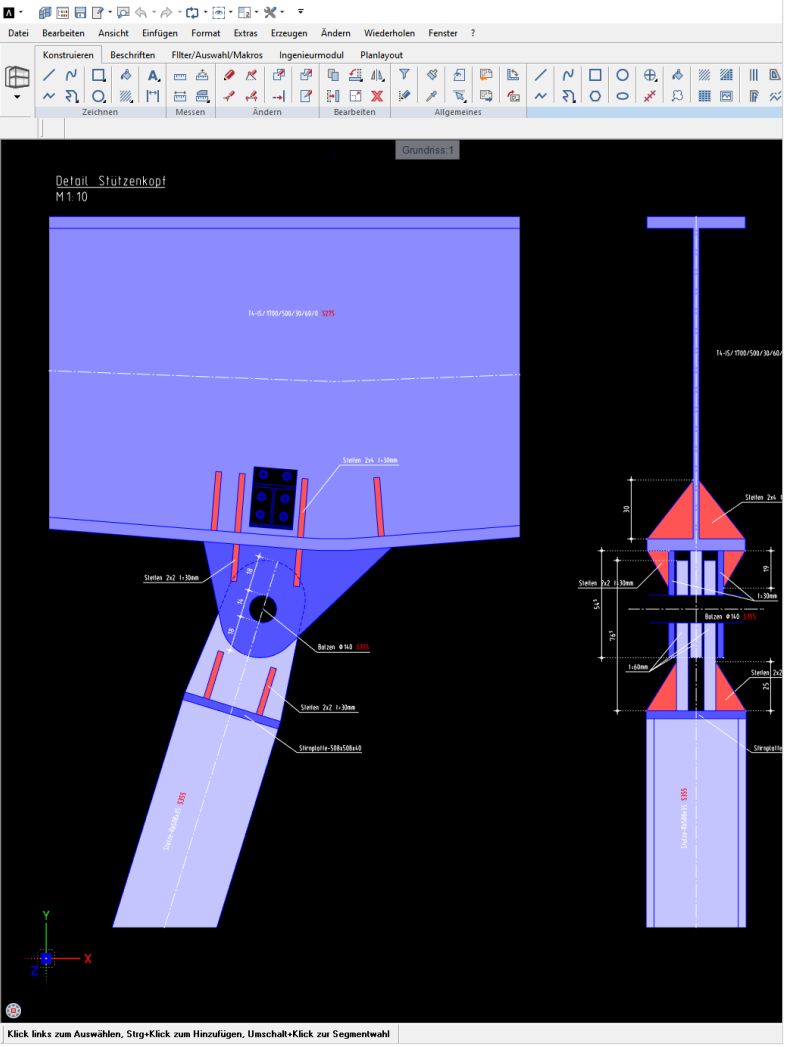
Diverse software for fast results

Several static systems were examined at the outset. The variant approved by the client and the architectural firm then formed the basis for load determination and an initial detailed design. The calculations were carried out element by element so that they could be quickly checked and adjusted at any time. Once the final dimensions and details had been approved by the implementation planning team, the construction-phase structural analysis could be prepared immediately. Overall, the engineers made extensive use of the numerous programs in FRILO, including:

- Reinforced concrete column design
- Continuous beams analysis for steel, reinforced concrete, and wood
- Pad foundation design
- Reinforced concrete slab design
- Steel column base plates
- Steel bolt connections
- Steel support/member design
- Punching shear checks
- Steel beam design

The individual modules in FRILO enabled the planning challenges to be solved quickly. The verifications were carried out with virtually no calculation time. Thanks to the versatility of the programs, various solutions could also be checked intuitively in a very short time and conclusions about feasibility and construction costs could be made quickly. Finally, complex geometries and structural details were exported from FRILO and transferred to the layout drawings in ALLPLAN.

Direct model-based data exchange between ALLPLAN and FRILO (e.g., via the BIM connector or IFC/ASF) was not used in this project due to the simple geometry of the individual components. Instead, steel details and connections were

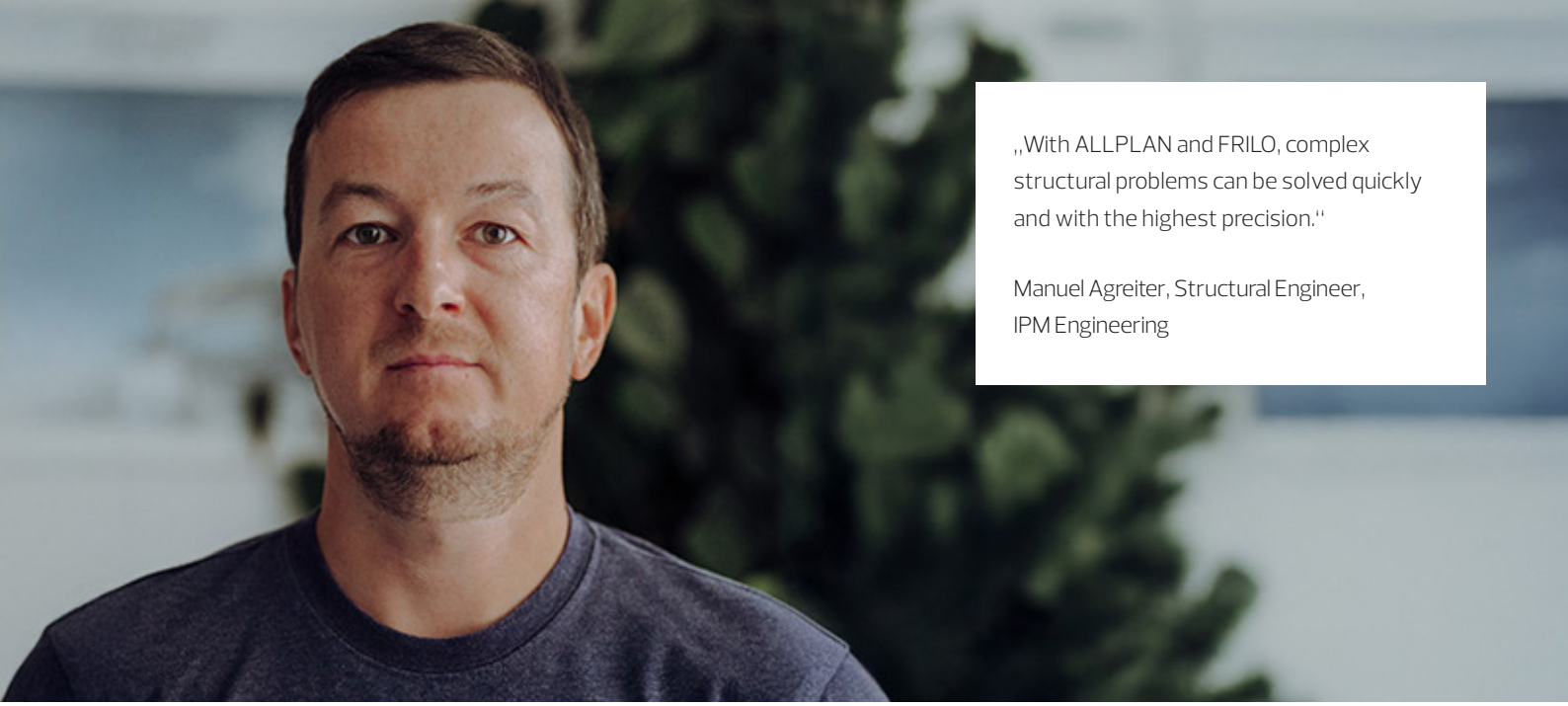


Located fourteen meters above the ground and projecting eleven meters out from the main hotel building, the annex offers an exclusive and spectacular wellness area.

calculated in FRILO, exported as DXF/DWG, imported into ALLPLAN, and located precisely. The reinforced concrete slabs with simple rectangular geometry were modeled and dimensioned directly in FRILO. The reinforcement design and drawing production were then carried out in ALLPLAN.

Delicate construction made of 125 tons of steel

Thanks to the planning in ALLPLAN and FRILO, expected deformations could be predicted with precision. At the same time, the amount of material required was reduced to a minimum. The result is a filigree construction made of 125 tons of steel that meets all aesthetic, architectural, and technical requirements.



„With ALLPLAN and FRILO, complex structural problems can be solved quickly and with the highest precision."

Manuel Agreiter, Structural Engineer, IPM Engineering

The customer

IPM Engineering was founded in Brunico in the Puster Valley in 2002 and has since developed into one of the largest engineering firms in the region. The engineering firm is the first point of contact when it comes to finding and implementing tailor-made technical solutions: from planning and design to implementation and completion. Its wide range of engineering services covers a variety of requirements from different industries in a wide range of engineering fields. A dedicated team of highly qualified engineers turns visions and projects into reality.

About ALLPLAN

ALLPLAN is a global provider of AEC software with BIM solutions for architecture, structural engineering, detailing, fabrication and construction. True to our "design to build" claim, we provide tools that enable earlier data-driven design decisions, support digital fabrication and leverage information throughout the entire construction process. Integrated cloud technology further optimizes interdisciplinary collaboration on building and infrastructure projects. Our innovative workflows empower architects, engineers, and construction professionals to deliver their projects more productively, safely, and eco-consciously.

Around the world, over 700 dedicated employees continue to write the ALLPLAN success story. Headquartered in Munich, Germany, ALLPLAN is part of the Nemetschek Group – a pioneer for digital transformation in the construction sector.

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