



Self-contained energy efficient building, Schwäbisch-Hall, Germany

hirschberg architekten, Schwäbisch-Hall, Germany

Energy at no cost

In these times of constantly rising costs for raw materials and energy, the spotlight is on planning, constructing and running buildings sustainably. In light of the scarcity of resources, it is increasingly necessary for architects and engineers to switch to planning methods that conserve materials and resources. One successful example is the self-contained energy efficient building in the German town of Schwäbisch-Hall, planned by the architects from hirschberg architekten.

Jens Hirschberg already has many years experience in the area of 'green building.' Since founding his architecture firm hirschberg architekten in Schwäbisch-Hall in 1998, he has specialised in the construction of passive buildings and the energy retrofitting of existing buildings. "It all started when I was building my own house. At the time, I realised that there were practically no manufacturers of green building components. We had identified a gap in the market here and so from the outset, we have focused on the energy-efficient construction of passive buildings," explains Jens Hirschberg. Since then, the architecture firm has planned and realised more than 50 passive buildings and its comprehensive range of expertise has brought the company recognition throughout Germany. "In addition to the difficulty we had in finding manufacturers for our components, it was initially also very hard to make calculations for passive buildings. The usability of the software programs on the market at the time was anything but ideal for the level of complexity involved in these projects. We have been working with Nemetschek solutions for six years and we now consider ourselves to be optimally equipped to handle the challenges we face in day to day planning," states Hirschberg.

Thermos flask principle

Passive buildings, also known as zero-energy buildings, use 80 percent less energy. This massive saving is achieved solely through the two basic principles: avoiding heat loss and optimising the exploitation of free heat energy. This is made possible by an optimally insulated shell that prevents energy from escaping. Thus, in a building requiring only minimal heating devices, energy consumption is reduced to a maximum of 15 kWh per year. The small amount of energy that does escape through the shell is replaced by passive solar energy or by means of electricity. A ventilation system controls the ventilation of the rooms by introducing fresh air and expelling equal volumes of stale air. "In the current climate of steadily increasing heating costs, we are seeing a growing demand for energy-efficient buildings. Even in the case of existing buildings, many people are considering retrofitting them to ensure that they comply with the latest energy standards," comments Jens Hirschberg.

Resource-efficient planning with Allplan

The concept of combining the highest environmental standards with extraordinary architecture has given rise to another project by Jens Hirschberg: "A steep piece of ground on a fallow, hillside vineyard came our way. It would not have been possible to use standard construction methods here without a substantial budget. Thus, 'Cliffhanger' was born, a project aimed at realising a building in this location without ploughing in inordinate amounts of effort or financial resources. The building is to be a residential dwelling the form a forward-tilting, red cube built into the incline of the vineyard slope. In addition to the remarkable architecture and location, the building's energy concept goes beyond anything that hirschberg has previously planned. The Cliffhanger as it is called, will generate all of its own power from solar energy, which will make it Schwäbisch-Hall's first energy-autonomous building.

Planning passive buildings is highly complex and experience has shown that it also requires a great deal of precision. Thus, Hirschberg has put his trust in Nemetschek's reliable planning software for this project. First, the complex design and detail planning were carried out in 2D. The two-dimensional detail drawings were then entered into special heat simulation programs. For presentation purposes, hirschberg later mapped the model in 3D in Allplan and used the interface to the CINEMA 4D visualisation software to create realistic animations. "The real challenge lay in demonstrating that, with the appropriate planning tools, it is possible to build a zero-energy building in any location. Furthermore, Nemetschek's software solutions allowed us to carry out planning with exceptional efficiency in terms of costs and resources," says Jens Hirschberg.

Optimised data flow

The window, wall and roof elements of the passive building will be prefabricated in a factory. Because the individual elements then only have to be assembled on site, the Cliffhanger will be ready for occupancy after just three weeks' construction time. "By using Allplan to carry out detail planning, we have managed to achieve a high level of quality in our prefabricated components. This means that the passive building can be fully assembled in a very short



space of time, almost like a car,” points out Jens Hirschberg. The architecture firm used the Allplan interfaces to facilitate a smooth flow of information between the various planning partners as well as seamless data transfer. “The fact that the structural engineer was using the same software meant that we had a similar structure on which to base our deductions. Thus, we did not have to endure the inconvenience of creating new drawings and copies, and there was no need to keep sending data to and from.”

This extraordinary project will soon be realised in the United States as well with the construction of a Cliffhanger on a similarly steep site in Santa Cruz, California. “California is a renowned centre of excellence for energy-efficient construction and offers us an ideal springboard from which we can make our expertise known to the wider audience,” concludes Jens Hirschberg.

