Convegno “Case ed edifici in legno”. Costruire in grande nel contesto urbano
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Intervento: **Grandi volumi: complesso abitativo e commerciale "Badenstrasse 380" a Zurigo ***
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The Contract

The contract is a ”Mural”, cladded on the facade and was the result of an competition for a building site art project. The jury was instantly convinced of the qualities of the winning project of the Danish artist group Superflex. As the residents of the house, are required to be a part of the solution to lower the energy consumption. But after all to allow a low energy use of a building the construction itself needs an optimized structure.

On a first glance the freedom of design will thus be radically restricted with the new requirement of reduced energy consumption. Will in future only houses exist, which are massive and compact boxes? And will thus the reduced possibility of spatial design result in a regression of our built environment?

We have to save on everything, surface, volume, material, costs and energy. And if possible there has also to be saved on thinking. The result: A lack of our cultural sustainability as a basis of limited possibilities of architectonical expression.

To show that it must not come so far I want to present you a mixed use project we accomplished last year, a seven-story wooden structure in central Zurich. It is the first building to comply with the demanding requirements of the 2000-Watt society program, which aims to lower the per capita annual consumption to 2kW by 2050.

Prototypes

We searched a language for this residential building, along 380 Badenerstrasse in Zurich that emphasizes the unmistakably urban context.
We found prototypes in town houses of Paris at the start of the 20th century. As an example, the building at the rue Franklin by Auguste Perret or the Building at the rue Vavin by Henry Sauvage. The rhythm of volumes on the street front features deeply retracted parts. This statement gives the volume a double exposure with view over the park at the rear. The design is also functional, placing more distance between the apartments and the noise of the main street. The dynamic feeling is repeated in the zigzag design of the facade elements, which, along with the corner windows, hint at the lightness of the building’s load-bearing wooden structure.

The Site

The Building

Made for a construction cooperative, the building at 380 Badenerstrasse serves as an example of how a project can be sustainable without sacrificing its status as a good piece of architecture.

The building consists of 54 mostly two ore three-room apartments. The rooms are arranged one after the other as a enfilade to preserve despite the limited surface a generous spatial feeling due to the line of sight through the whole length of the building.

2000-Watt

Sustainable construction means on the basis of our experience above all the search for intelligent and simple building principles.
All resources should be used and foremost those that are for free and are using hardly any energy: our mental resources.

If 2% of the life cycle costs of a building are attributable on the development, so obviously there is the main impact for a reduction of the energy-consumption and therefore also of the life cycle costs.

At the start of the planning process the main decisions are made, which have the maximum effect on the costs and energy-consumption. The more the building process goes on, the fewer are getting the possibilities of influence and there efficiency. Because of that fact, there has to be in an early phase of planning enough time for optimization of the system to realize a long-term energy consumption.

Intelligent building means that all partners involved on a construction, such as the developer, the architect, the engineers and the contractors, should determine together their objective. First of all the client has to commit the aim he wants to achieve. The solution will be constantly checked on the goals not only on the term of design to cost, but also on the term of design to 2000-Watt.

On the following example at 380 Badenerstrasse not primary technical innovations in the sense of inventions or an increasing level of technology carried to the result. The innovation was that of a permanent check on all the planning steps and to reconsider all decisions made on their efficiency concerning sustainability. A whole bunch of solutions were uncommon and the results often surprisingly simple.

I will present you on three exemplary elements, the construction, the façade and the ventilation how this aim was achieved and led to the specific results in this building.

The System

The construction is simple: six floors built of solid wood sitting atop a reinforced concrete ground-floor slab. The work was carried out using the Topwall system (Invented by the wood engineer Hermann Blumer, the same that finally made the roof construction possible of the new Center-Pompidou Metz in France by Shigeru Ban)
With a series of fir-wood beams attached one to another and then insulated, stuccoed and clad with fibre-cement panels on the outside. The prefabricated floors are connected to the walls via wooden dowels. The energy required to run the building is supplied by a heat pump, solar panels, and the recycling of heat produced by the supermarket on the ground floor.

The Wood Construction

We searched for a solution that must combine a scientific approach to resources and renewed sensitivity to their qualities. In architecture, wood has this potential. Multifarious and versatile, wood has shaken off its status as a rural Alpine cliché and is now recognized as a high-tech material with a low environmental impact. If well managed, its production is unlimited. In this case production takes place in forests, operational ”factories” that also offer recreational space, while absorbing carbon dioxide and producing oxygen as a by-product. The advantages of building in wood are many: lightness, speed and ease of construction, precision, fewer unexpected contingencies during work, variety, beauty and natural comfort.

Indeed in his lectures for Harvard 1985/86 (Six memos for the millennium) Italo Calvino cited lightness, quickness, exactitude, visibility, multiplicity and consistency as being the most important characteristics fort this millennium.

The Room Ventilation

A special invention for this building was the peripheral room ventilation. Not to confound with an air-condition this ventilation allows with a passive heat exchanger for each room a separate ventilation, that provides fresh air at a room temperature without opening the window. Especially in the winter months when the heating is on this solution saves a massive amount of Energy. The passive heat exchanger consists of a bundle of aluminum tubes where the inflow air is heated by the exhalation air. The whole system is operated by two electro motors from Maxon, which also provided their motors for the Phoenix Mars lander of the NASA.
Each ventilation-box has a capacity of at least 1100ft3 and the exchanger has an efficiency of 80%. The electricity is provided by solar panels on the roof.

The Facade

After evaluating different façade systems about their aspects of sustainability, grey energy and recycling capacity, the choice was made for a suspended façade in fibre-cement. On a first glance not a very Green-material it proved to be efficient. With short distances from the production plant to the construction-site of about 30 Miles, the production itself uses little energy compared to his life cycle. The material cement and glass fibres extruded and dried at air are completely of mineral basis and thus are totally recyclable.
With the possibility of extrusion we designed a specific form that was due to the buckle stiffer, so that we could reduce the aluminum under-construction of about a third. This also allowed to reduce the thermal bridges of the mounting brackets, save also money that we could invest in the individual designed elements for this façade.

Outlook

With a next project we try to go even further with the wood construction. At the northern edge of Zurich in a new development called Leutschenbach we are planning four houses with about 102 flats. One of the buildings will completely built in wood. The walls also as a massive wood construction have added wooden dowels where the insulation and the façade can be fixed without any metal brackets. The negotiation with the fire-department is going on with the aim that we can spare the inner cover in plasterboard due to the good
fire performance of massive wood.
Concerning the floor plate we are experimenting with a hybrid wood and concrete construction, to achieve both the advantage of the massivity of the concrete for the acustic protection and the building speed of wood constructions.

Conclusion

In this sense I want to conclude with a reflection about the principles of architecture by Vitruvius dating the first century before Christ.

Firmitas – Utilitas – Venustas
Stability – Utility – Attractivness
Firmitas should nowadays not only be interpreted with stability but rather with the term of architectural sustainability. Architectural sustainability, as the sum of a technically and an energetic optimized construction. That this solution stays sustainable and will be supported by the users in a long term it has to be reconciled with the design ”Venustas” and the user requirements ”Utilitas”.