



SUSTAINABLE ARCHITECTURE
UDRŽATEĽNÁ ARCHITEKTÚRA

COMPONENT DESIGN

A METHOD TO DESIGN SUSTAINABLE HABITATION

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Introduction

“An architect who does not love, should not build”. When Heinz Tesar said this sentence during a conference in Salzburg in February in 2011, it implicated a deep understanding for a client as well as for the site and the context of a design task. Love is the main foundation for a good relation. Healthiness is the positive result of living in a good relation. Architecture is the physical image of relations. Most unhealthy developments in housing as well as in urban planning can be described by a lack of relations. Component design is a design method based on the idea that the architect mainly leads the process of putting things / components in the best relation to each other – the client to the site as well as materials to the dimensions. It’s not primarily important whether it’s wood, glass, concrete or straw as material for a building or if it’s big or small or using solar energy or a heat pump, we need to focus our responsibility as architects on keeping the holistic view in mind, which basically consist of leading a complex design process in empathy.

1 What we can learn from autochthon architecture ...

The most sustainable architecture was created without science and without architects. It has been developed and improved over centuries by farmers. One example is the typical swiss farmer building, constructed just out of materials from the sites without any machines and without any extern input of energy except manpower. In many different cultures we can find similar high quality evolutions.

The quality of autochthon buildings can be summarized in mainly four aspects:

- Positive relation of the building to the local site
- High level of identification of the user with the building
- Almost no energy impact for the construction
- Beauty as a result of simplicity and functionality

1.1 Respect to nature

Richard Horden uses the phrase „touch the earth lightly“ [1] to describe a respectful relation of architecture towards nature. The storage building (pic.1) is lifted from the ground in order to protect the architecture of humidity as well as mice. Instead of using big foundations the farmer has looked for the appropriate location, where the ground was strong enough to resist against the weight of the building using just 4 pieces of stone. So respect has to do with looking carefully and starting with listening not telling what to do. Secondly the intervention should enrich the site and stress the beauty of nature.

We can learn from this respectful attitude and apply it to the design process of contemporary architecture. One case study is the eventcenter silvaplana (pic.2.), which was developed by three students from Munich with the help of the international teaching team. Before starting to design, a trip was organized to the site and students were asked to look carefully at the traditional farmer buildings. In the case of this touristic center for press people for snow events, the respect to nature can be described in three main decisions:

- Small three point foundations which can be readapted
- Lifting the architecture from the ground with the result of a protected secondary space and the visual benefit that the landscape isn't stopped in its flow.
- Self sufficiency with a complete PV-roof, vacuum insulation and led-lighting



Pic.1 swiss storage building, foto, Zermatt 2003 by Burkhard Franke



Pic.2 eventcenter silvaplana, digital rendering, Munich 2006 by the students Rist, Uhl, Wendnagel, department of architecture and product design TU-Munich

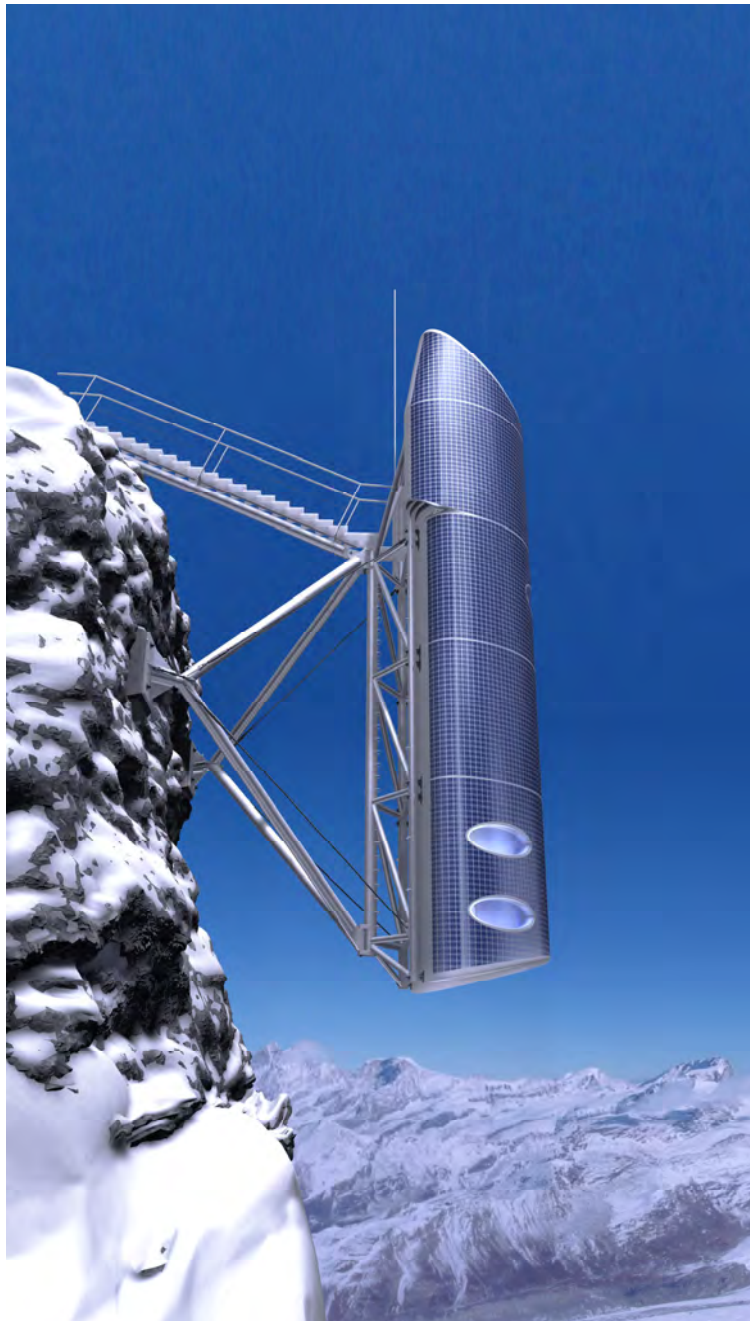
1.2 Functional Design

One main character of autochthon architecture in the Alps is simplicity. Nevertheless people have used the functional details like a hole for the important natural ventilation of an attic to shape it individually (pic.3). This freedom for creativity has nothing to do with decorative ornaments in many hotels of mass tourism.

What we can learn from this traditional way of design is that we just need to shape the details which are technically necessary. One recent example of designed ventilation is the self sufficient project peak_lab (pic.4) developed for the Kleine Matterhorn on 3900m.[2] The temporarily installed project can be transported within six flights of a helicopter. Fresh air is aspirated in the entrance module below in order to prevent the absorption of snow. The opening is designed with fins inspired by aircraft design.



Pic.3 hole for natural ventilation of an attic, foto, Tyrol 2005



Pic.4 peak_lab, research project for the Kleine Matterhorn on 3900m, collaboration of the team of Richard Horden (TU-Munich) together with the team of Ueli Pfammatter (HTW-Chur), digital rendering 2003 by Yann Friedl

2 What is healthy Architecture?

As said in the introduction, healthiness is the positive result of living in a good relation. Architecture is the physical image of more or less designed relations. People appreciate the atmosphere of old villages or towns because of the readable relation of the houses to each other. That's why people feel well in historic centers. Tourists look for this feeling of happiness – especially during holidays.

Historical houses in European cities had no heating apart from local stoves, no warm water and up to the last century no bathroom or toilet inside the flat. But was it really unhealthy? How important is comfort for healthiness? I am convinced that our contemporary stressful lifestyle asks for

recreation areas and wellness. But people look at the same time for more stronger relations to the urban context. Facebook and youtube cannot substitute physical meetings of people in the long run. Society is more and more connected and at the same time loneliness is growing. Loneliness is the result of non working relations. The architect can design the physical world in all scales from the furniture up to town planning. Therefore the main challenge in designing today is to improve relations between members of a family as well as between generations and cultures.

In the following chapters a focus is laid on two aspects to explain the importance of good relations for healthiness.

2.1. Individual Prefabrication

A high level of prefabrication is the result of the idea to reduce high costs at the building site. Another benefit is that the workers can plan and prefab most components of a house in the factory in comfortable conditions instead of working for a long time outside. By the way, the quick installation at the site reduces the disturbance of neighbors and nature. So prefabrication is a positive achievement in general.

But the first main point is the individuality of the prefabricated architecture in terms of the opportunity to

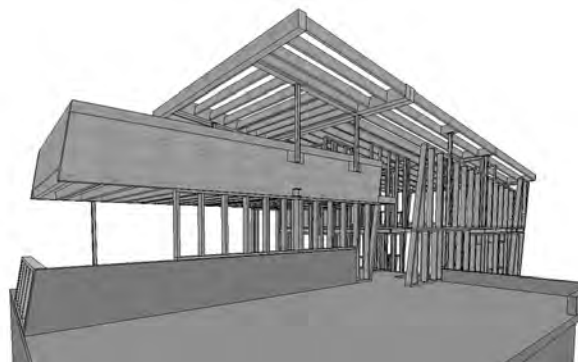
- react to the individual site conditions like topography and views
- react to the spatial requirements of the client
- react to the cultural context (contemporary interpretation of local tradition)

The second main point is sustainability of prefabricated architecture in terms of the opportunity to

- design the building in that way that it will be accepted for a long time without major changes
- design the building in a self sufficient way which is appropriate for the client and the site
- design the building in that way that local industry and local materials are used in an efficient way reducing long transports and primary energy.

One case study is the „house on the hillside“. It is regarded as healthy architecture because it reacts to the slope topography and to the best views as well as to the spatial requirements of a family and a grandmother living in the same house.

Construction planning is drawn three-dimensionally (pic.5) and the building is prefabricated by a local wood company. The main part of the house was installed in two days (pic.6). Most glasses are orientated to the South and a heat pump supports the energy efficiency of the building.



Pic.5 three-dimensional construction drawing of the “house on the hillside”, Tyrol 2006, Schafferer Holzbau GesmbH, design and supervision by klaszkleeberger 2006



Pic.6 “house on the hillside”, foto by klaszkleeberger during supervision, Tyrol 2006

2.2. Lifestyle of Health and Sustainability

Architecture is a discipline with a very strong link to cultural developments. Human Sciences speak of the LOHAS – The Lifestyle of Health and Sustainability. [3]

Stéphane Hessel stresses in his polemic paper „Indignez-vous!“ [4] the importance of being not indifferent but responsible for the world and the main issues like justice and social security.

In this sense every architect and designer is fully responsible for the health of people and architecture. In an architect’s daily life it is often hard to make brave decisions especially in time pressure or in a financially limited situation. But the responsibility is not abstract. It can be sometimes quite practical. Four examples will help to understand in detail:

2.2.1. New spatial concepts in existing buildings

Instead of choosing the easier way to knock down an old building, in some cases it’s more healthy to reuse them although it might be more expensive. In the case of the project Dollinger (pic.7) the 100 year old farmer house is reused as a loft for a young family. As there was no space for a classic bathroom the shower is situated in the gallery with view to the dining table. An open attitude of young people can allow unconventional solutions which save energy and use of material. Even some old beams are reused for the new stair to the upper level. To the existing building there was just added a simple box for the office of the owner to keep living and working together.



Pic.7 Haus Dollinger, reuse of a farmer house, Hippach in Tyrol 2007, foto by klaszkleeberger, design and supervision by klaszkleeberger

2.2.2. Combination of High Tech and basic Materials in new buildings

One aspect of creating good relations to achieve healthy architecture is to combine the best available technique like cnc cutting machines with the use of sustainable materials like wood, straw or clay. In the case of the Haus Schönwies it was decided to prefab the massive woodhouse and to build it up in two days including all preparations for the insulation with straw (pic. 8) and the loam rendering (pic.9) above wall heating from solar energy.



Pic.8 Haus Schönwies, insulation with straw, Tyrol 2006, foto by w. Kłasz, design and supervision by w. Kłasz



Pic.9 Haus Schönwies, loam rendering above wall heating (solar generated), Tyrol 2006, foto by w. Klasz, design and supervision by w. Klasz

2.2.3. Architecture or products as Instruments for living

The i-home (pic.10), later called micro compact home, was conceptually developed at the institute of architecture and product design of Prof. Horden at the TU-Munich. The main quality of this architecture is that it's not so much a building to provide space but more an instrument for living. Some modern people like travelling managers or exchange students do not need to look for a flat, organize furniture and so on. They can just rent a micro-compact home and concentrate on their real interests like studying, working or meeting people. It is a very compact instrument which supports people to have more time for each other and to enjoy nature.

The office klaszkleeberger is currently developing a multifunctional product, which can be transported easily and used in summer at the lake or rivers (pic.12) as well as in winter on snow.

This instrument helps people to enjoy nature in a sustainable fascinating way like the micro-compact home does as habitation. It's a product of health and sustainability because it promotes people to make sport, to be in nature and to transport it by train or by foot.



Pic.10 i-home, digital rendering (Daniel Oswald) to show the special concept, Munich 2002, department of architecture and product design TU-Munich



Pic.11 multifunctional boat project (in development), abstract foto by Markus Tretter 2011, design and project management klaszkleeberger (together with Carla Baumann and Thomas Seitz), consultancy TU-Munich

2.2.4. The fireplace displaces television

Not everything must be compact - there is nothing wrong with providing generous space for people and communication like it was done for the monks of a monastery in Innsbruck (pic.12). The design is healthy in the sense of improving relations between the people by organizing the space next to a fire place instead of a television (pic.13). The individually designed furniture (including lighting) is not over-presenting itself but is rather asking the user to sit down and to keep conversation.



Pic.12 recreation room of the monastery Stift Wilten, Innsbruck, foto by klaszkleeberger 2009, design and project management klaszkleeberger



Pic.13 recreation room of the monastery Stift Wilten, Innsbruck, design sketch by Walter Klasz 2009, design and project management klaszkleeberger

3 The method of Component Design

The method of component design helps to create relations and as a result it also helps to design “healthy architecture” just to quote the title of the conference in Bratislava. It’s simply about putting components into the best relation to each other. But it’s not so easy to find out what the most important components are.

The design method can be summarized in four main points which have to do a lot with the qualities of autochthon architecture, mentioned in the beginning of the paper:

EMPATHY: Listening carefully to the client, the site and the local culture

IDENTIFICATION: Using local materials with the help of modern technology

REDUCTION of size, material and energy impact

INTUITION: Keeping freedom for intuition while leading the interactive design process

In the last chapters these four points will be explained with the help of four case studies:

3.3. Empathy

Case study project: Office Deloitte Innsbruck, 2009 (pic.14):

The task was to design two storages of an existing office building with the freedom to change everything including the realization of a new internal stair and the possible exchange of concrete columns into steel.

In this case the main task was to understand the culture of the international company Deloitte as well as the culture of the actual team of 21 people working in the office in Innsbruck. Empathy is active listening. During the first meetings it was soon decided to change and to improve the working atmosphere by aiming to enhance common space for communication and more compact shared offices. It was found out that the secretary should have the pole position with view in all directions including the stairs (pic. 16). The area of the secretary is lifted by 20cm so that she is almost on eye level with the arriving clients while sitting on the chair. Employees and clients enter the office in the upper level and are invited to stay for a short talk or coffee at the bar in the center. The bar is designed in such a way that the concrete columns are not seen anymore. The first column at the entrance is changed into steel and painted black to put it emotionally in the background. The color system is reflecting the corporate design of the company Deloitte.



Pic.14 entrance area of the redesigned office Deloitte, Innsbruck, foto by klaszkleeberger 2009, design and project management klaszkleeberger

3.4. Identification

Case Study Project: Haus Dollinger, Hippach in Tyrol, 2007:

In this case the son Paul Dollinger was about to inherit an existing building which consisted of a hundred year old part with some extensions of the 70es and 90es. The parents should be able to continue living in the lower level whereas the son was allowed to change the rest of the building (pic.8.).

The son works in the area of marketing and event organization. He has an understanding for brand awareness and he is critical towards kitsch. At the beginning of the work he was not able to identify himself at all with the building he should inherit.

The main task was to achieve an identification of Paul Dollinger with the redesigned building. This process had started by discovering the character of my client. Sharing also spare time like mountain tours I had opportunities to find out the main personal qualities of my client which were authenticity, honesty, directness and courage. One way of achieving identification in architecture is aiming towards the characteristics of the client himself. Luckily in this case the client had a good character. In other cases either the client has to change, or a project might fail or, it shouldn't be realized in the first place because the architect is committed to the cultural responsibility.

One detail of the design is the use of untreated steel to support the structure of the finally open space. Students of the TU-Munich visited the client every year. The feedback from the young architects was that Paul Dollinger seemed to fit very well into the space and that he seemed to be happy (pic.16), which is an argument to call this architecture healthy too.



Pic.16 Paul Dollinger, client and owner of the redesigned Haus Dollinger, Hippach in Tyrol, 2007, foto by klaszkleeberger 2007, design and project management of the Haus Dollinger klaszkleeberger

3.5. Reduction

Case Study Project: Familienkapelle Fraxern, Vorarlberg, 2010:

The task was to design a new chapel on a certain place on the mountains, where in early times an old chapel was removed. The new ritual building should invite also families and young people to spend some time in silence or devotion.

Especially in projects in the nature reduction becomes very important to achieve a good relationship between the building and the landscape. How small can it be? What's the way to

reduce the impact on the environment to the optimized minimum? How much material do we need?

In the case of the Familienkapelle Fraxern (pic.17) it was decided to use just three materials: Untreated wood for the outer facade (simply cut trunks), glass for the inner facade and concrete for all the rest including floor and roof. The size of the chapel was reduced a lot, because the space looks far greater having the view through the facade in all directions. The chapel is lifted off the ground and placed on one main foundation with a certain distance to the surrounding trees.



Pic.17 Familienkapelle Fraxern, Vorarlberg, foto by klaszkleeberger 2010, design and project management klaszkleeberger

3.6. Intuition

Case Study Project: Kirche und Gemeindezentrum Rif-Taxach, Salzburg, 2010/11 (pic.18):

The office klaszkleeberger was asked in 2008 to develop a feasibility study for a possible joint project for a municipal center and a church in one building. The site is located next to an existing building of the catholic community in Rif which should be connected to the new church. One main goal was also to achieve self sufficiency for the whole project.

Some facts have been taken as firm parameters like

- The dimensions appropriate to the functions and possible costs
- The need of two separated covered entrances for both communities

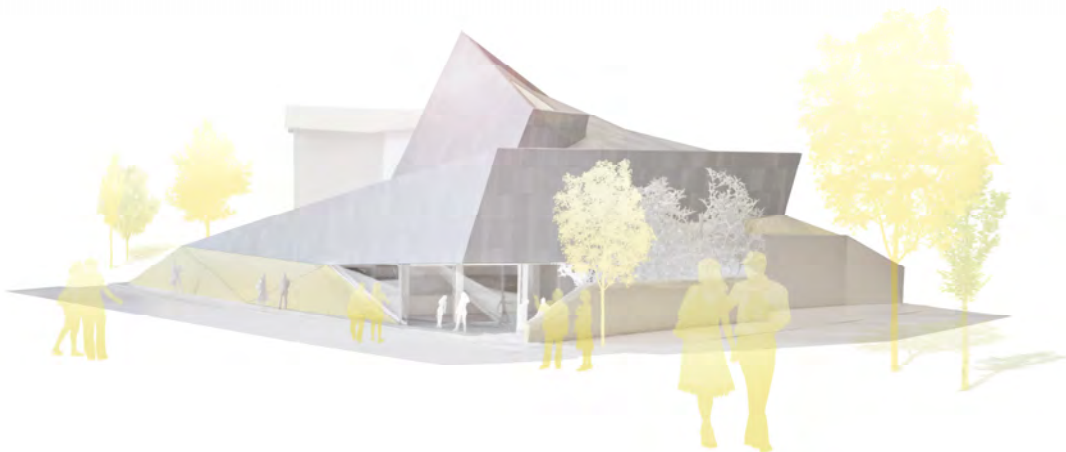
- The need of inclined surfaces to optimize the efficiency of solar energy without losing spiritual touch
- The need to minimize the impact on and disadvantages for the neighbors

On the other hand there have been soft parameters to be considered like

- The demand of a modern ritual atmosphere in the church
- The clear separation of the two functions (municipal center and church) under one roof without losing identification of each part.

Intuition in this context of component design gathers both, the genius of the architect to design the firm and soft parameters as well as the feeling to guide an interactive process with all involved persons of a project.

Intuition is the opposite of parametric design, which is coming up to be taught at many universities at the moment. Parametric design is a useful tool for many projects but it is not a flexible method to handle soft parameters like social acceptance, art or crisis management in a team of project. The intuition of an architect it's getting more and more important of an over organized building world of consultants and techniques.



Pic.18 Kirche und Gemeindezentrum Rif, Salzburg, 2010/11, foto of the presentation model by klaszkleeberger 2010, design and supervision klaszkleeberger

4 Conclusion

Architecture is built relation. Good relations are healthy.

The method of component design is a tool to design relations. The four main points are Empathy, Identification, Reduction and Intuition.

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