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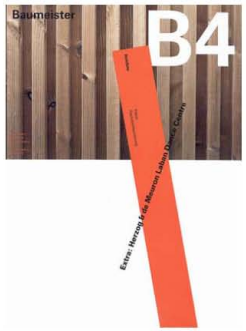

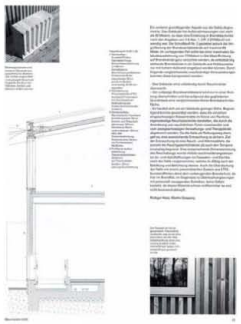

Discussing the issue with specialists in this field, the advantage of wood being organic and with that so similar to the human being, turns out to be at the same time and to the same extent its disadvantage. This can be diagnosed as a western culture only for the forever young and virgin appealing to human beings by acceptance and besides, this message is massively preyed on by the mass media. Opposed to that, any natural aging process is rated down. In the media this phenomenon is drastically expressed by beauty surgery series and the equivalent in the building world in terms of wooden facades. These are periodically coated with a white paint, which refers back to brightening toothpaste.

A different attitude is to be found in the regions that are more exposed to nature's forces, as along the coasts or in the mountains on both the European and the American continent. Architect Charles Moore's classical Sea Ranch at the US west coast [1] is an architectural icon out of sheathing with more or less local hardwood, that when correctly applied, resists the extreme climate. And by letting the salty air and strong ultraviolet sun turn the exterior into a grey coat, it fits into the environment of working with nature, instead of against it. In the German, Austrian and Swiss Alp Mountain forest regions the tradition of wood construction and cladding transcends into a publicly agreed new wood architecture. The exposure to nature's power in the form of steady gusty winds helps in regulating the humidity and allowing the wood surfaces to get a more equal patina. This creates a natural look such as the face of the farmer in the plains or mountain men in the mountains, that is structurally carved by the wind and the sun and by this has its own beauty. In a growing sense this creates better health and an eco friendly environment that has been used for the marketing of natural food products. Taking a closer look and tracing a comparison to nature and the structure of the bark on the trunk of a tree, we see striking similarities in approaching a sustainable notion: the ultraviolet light darkens the skin as a protection for the surface below and carvings drain the humidity either sweat or rainwater. An interesting pre-conclusion becomes obvious, when interviewing people about their likes and dislikes of wood. Most of the people interviewed go for fresh cut, virgin looking or preserved wood. But the rugged, rural, grey and equally aged wood conditions also get accepted. Picture albums give proof of evidence in the form of vacation manifestations of summer trips around coastal lodges or cozy log cabins from the latest ski vacation.
Using the imagery of a wooden building rather than its concrete physical appearance has a long tradition since European romanticism. For instance, the king of Preussen, Friedrich Wilhelm IV, in 1847 tried to cure the homesickness of his Bavarian born wife, Elisabeth, by building her a replica of a Bavarian log cabin in the center of the Wilderness Park in Potsdam. Following World War II the leader of the socialistic East "German Democratic Republic" Erich Honecker, although praising and practicing a strict modernistic architectural approach for the people, chose for himself this so called "Bavarian house" [2] as a cozy background for private and official representations.

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Rebuilding the former East Germany after the reunification of November 1989, followed specifically in picturesque area's with a rich wooden architectural history like the "Baederarchitektur" [3] on the island of Ruegen exclusively historical pattern. This compared to the new urbanism in the USA seeking the solution of healing the contemporary human being with the realm of old-fashioned craftsmanship and details. The desire for the wooden vernacular has recently been in the process of being professionally touristy engineered and being promoted by the leisure industry. Referring to the aura in the turn of the 20th century, lodges in the USA, like Robert Reamer's groundbreaking Old Faithful Inn in the Yellowstone National Park or the 1936 Oregon Timberland Lodge, today's clever hotel managements are trying to build upon the sentimentalities of people regarding these eras as opposed to contemporary, unpredictable and hectic times. Rarely these enterprises make use of the historical predecessors as a spatial and tectonical starting point, to then find an own state of the art and architectural interpretation. In this new trend known as "parkitecture" [4], most of them are rather literal replica of the architecture of the "old times" that represent only the "good ones". A positive exception to the rule is the Amangani Resort hotel in Wyoming, where the hotel chain's corporate office and Paris architect, Ed Tuttle, who formerly grew up in the Pacific Northwest, was melting the cosmopolitan and the vernacular, by basically focusing on the potential of space and views with natural pre aged materials in a modern manner. However aging is generally disliked by the majority of people especially when it came to the ordinary average architectural term of their own home in the in-between stadium of partly grayed or blackened and in other areas still the bright wood, that was archi-tectonically generated by roof overhangs or window setbacks.

4. Development / Results

The architectural work of Despang Architekten made use of this based research knowledge in investigating in the potential of sustainable wooden building concepts on a natural but yet truly modern and contemporary basis. In the case of the design for the school for mentally disabled children in Garbsen/Germany [5] this goal was achieved by seeking an already preliminary consistent materiality responding to the extremely strong demand of addressing all the five senses of these very special children. On a small lot in an existing school complex, blending the urban edge into the surrounding landscape, a pavilion courtyard type organization was applied to integrate natural conditions in form of open space, light and air into the building. The tectonical concept was driven from an idea in regard of the substance of a section of a tree itself: inside a notion of stimulating bright wood that on the outside is sheathed by a protecting 'crusted" bark.

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The concept was additionally tailored based on another analysis of a common misunderstanding in terms of wooden buildings. People in northern Germany consider only monolithic or CMU compounded brick structure being “real buildings”, as opposed to from their point of view unworthy wooden buildings. This judgment is mainly based upon a presumable feeling of durability / stability and comfort within a brick house. Although in its roots originated in Germany itself, the public refers to the common light weight wooden structure in the USA as unaccepted “toothpick” houses that are likely to be blown away by hurricanes. The aspect of comfort relates to “being so cozy warm in winter and refreshing cold in winter”, addressing the aspect of thermal storage of a material in addition to it’s ability of stabilizing moisture and humidity throughout porosity. By that it becomes obvious that a comparison of materials is made without considering the structure and its related quantification of material use, so it is everything but a fair and objective evaluation, like comparing apples to pears. In the design of the school in Garbsen this research led to the decision of solving the problem of the lack of thermal mass by applying the wood massively in form of the “Brettstapelbauweise”, a board staple-structure. This system of nailing the boards to each other in a structurally engineered way, so that a slab results, was chosen for the application for the entire structure of load bearing walls and ceilings. Julius Natterer, Professor at the Ecole Polytechnique Fédérale de Lausanne / Switzerland and main mentor of the system, calls it a social structure, where the weakness of one member (board) is compensated by the other ones.[6] This structural/tectonical principle nicely describes and stands as well for the pedagogical concept of solidarity, as being primary for the education of mentally disabled children. The emission free system with the boards just nailed to each other without laminating them provides a stable building climate throughout the large thermal mass of the wood. To the same extent, the wood insulates already rather well, so that an average amount of insulation applied on it, achieves a much better u-value.

The goal of a consistent appearance outside matching the vertically louvered surface of the inside, the same pine boards could be used, by applying the emerging and innovative Heat Modifying Technology (HMT), that is intensively researched and promoted by the “ihd / Institut fuer Holztechnologie Dresden gGmbH” / Germany [3]. Whereas untreated pine wood does not provide the affordable resistance against biological and insect attack, this improvement makes it to withstand the existing conditions of a north facade facing a greened alley. This special technology of heat treatment upgrades the resistance of the wood remarkably. The immense environmental achievement of Heat Modified Wood is furthermore based upon mankind’s appreciation of darkened, tanned and evenly textured wood that is characteristic for trees in seasoned less regions which are mainly tropical areas.

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The massive and vast diminishing of the tropical rain forest is scientifically proven to have a hazardous impact on the global climate. The Heat Modifying Technology has been mainly invented to enhance the resistance against biological and insect attack, that occurs based upon high humidity.
Since the HMT process, almost as an effect on the side, let’s the wood turn dark, this might be the largest green potential of the process, because it makes heat modified wood attractive as an alternative for tropical hardwood. HM-wood by this, being already a very sustainable product additionally helps to preserve the tropical rainforests and the global climate. The wood has been additionally serving the local environment, by having been regional softwood trees prior to becoming a HMT product and in this previous function, intensively helping to convert coal oxidant into oxygen. Even the energy for the modification process can be recruited from the natural resource circle itself, by firing the heat chambers with the same fast growing regional wood that will be modified. Whereas, the HMT is undoubtedly to be adopted with a best conscience, the product has yet to find it’s own identity, it’s soul, as a requirement for being accepted, which again is the basic requirement for sustainability. Its advantage of being a compensation for tropical hardwood strikes back, because it is diminishing the material to the same extent to being just a substitute for something more valuable. The potential for its own character is yet obvious, but has to be explored furthermore on a broader architectural level. As opposed to tropical hardwood, due to the lack of seasons, is often missing grain. The variety of these natural textures of local softwood can be strategically used, as the tectonics of the school in Garbsen demonstrate. Throughout the fine rhythm of the boards and the battens system, the texture of the pine wood works almost as a natural ornamentation. A following positive example of architectural anticipation was the lake front house in “Steinhude” by the Berlin based architect Holger Kleine, built not far from the school two years later in a similar tectonical manner [8]. In this case the heat modified wood smoothly follows the curvilinear and ensures durability in the humid lakeside environment. As the school before, this project had a great echo in the architectural press, that demonstrates and proofs the success of qualified architectural design as a way to catalyze the popularity of HMT. In both cases, the materialized tectonical improvement made the earlier mentioned “farmer-face-strategy” possible. The heat treated pine wood, made by diminishing the crystal water in the wood, already reacts like the tanned skin, protecting the cells underneath and ages very much in retrospect and very equally. As part of the vertical tectonical sheathing elements like windows, gutters, down sprawls are integrated flush into the surface. Like the human skin of the farmer, the façade of the building in this way has the chance to age in honor. Making use of this research led to the similar calculation of the human resonance:

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the building is received as well, as when people were asked before about their acceptance of a tree's trunk, where no one had complaints. Despang Architekten´s project that is building upon the previous experience but yet pushing the envelope to an even further extent is a kindergarten building project in Hannover / Germany. For another public client with a limited budget, the goal was to create a building with high comfort, while assuring a natural environment for the children. In addition to ending fossil resources, it is mostly independent from this kind of energy. The building is situated in a consistent 1960´s neighborhood, with a high urban quality and replaces an existing structure from the 1970´s. The neighboring structure is a sustainable neighborhood grocery store center designed by Despang Architekten in 2004 [9] that received the Lower Saxony States Award of Architecture[10] that year in regard to the chair of the jury Professor Carsten Roth of Hamburg/Braunschweig/Denver for it's rigid but poetic structure of a concrete frame. In terms of a neighborhood kindergarten building, the existing site with a yard of mature trees was carefully adapted to redesign the building type. As a research result of the Garbsen school, the north side is treated in a similar manner, hosting the serving rooms, sheathed by a screen of heat modified wood battens that change from opaque to opal running over the solids and voids of the surface. The approach of the application of the heat modified wood though goes beyond the achievements of the former one, by documenting the HM process itself and using this as a creative exploration. In the areas of the windows, the brightest HM wood is applied, which is the one that had been processed the shortest time. In the closed wall areas the darkest one is used. In between, the transition from bright to dark will generate a notion of motion. Although again left untreated, without additional paint coating, the color difference is getting less strong over the time, due to generate by different wood still kept. The application will enhance the character of HM wood and be of major contribution to the no emission building concept, which will be an opportunity to promote the material being rather unique than substitutional. However this prototypical emerging project needs once again the support of the international HMT-community to make this concept happen.

To keep the heat out in the summer and the cold in winter, highest insulation is incorporated. The search for the appropriate structural system proves, at least from a European point of view, that potential is to be found where it is expected at least, in the USA domestically most common platform system. It was selected, using TJI studs with a foot deep insulation out of cellulose as another aggregate condition and use of trees.
Surprisingly enough research sources trace knowledge about this as far back as the last major global awareness of ending fossil resources and a concept for a research house in Denmark of 1973 [11], symptomatically the date of built of the previous building on the site.

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The necessary thermal mass is provided by massive wooden ceilings, once again in the board-staple structure and a PCM (Phase Changing Material) enriched concrete floor slab, again disconnected from the earth by a foot deep insulation. The curvilinear southern façade is entirely out of glass and maximizes the solar gain and transition of space from the inside to the outside. The existing trees and custom made umbrellas keep the building from overheating in the summer. This building will, although neither the kind of romantic log cabin nor the beloved stone building convince the user and the client because of its quality, to be out of a material that cleans the environment and does not even pollute it, as the most ideal case of environmental friendliness. The project points out another important aspect by obeying all the parameters and applying all the tools of "passive house planning": this alone does not yet generate a result that is satisfying from an architectural point of view. In other words green vocabulary does not automatically enable to speak a green sustainable language, because architectural quality in a balanced relation of form, space and tectonics needs to be integrated to make the building pleasing to it's occupants and endure or be able to be adapted, which is one of the most important integral aspect of sustainability. As much as the lack of environmental building sensitivity has been a concern in the past, it will be a problem in the future by the lack of innovative architectural character of "passive houses" in Germany. They were documented by gluing together styrofoam boxes and can already be seen as the next problematic issue, keeping green building design away from becoming influential on a broader, widespread level. The kindergarten design by Despang Architekten demonstrates that "passive house" design does not stop with creating the volumetric ideal of a cube or bowl as the buildings form, punching holes in a predominantly closed north façade and glazing the south façade. To deal with these physically generated parameters, it is not the final destination but the starting point in greening design. From there on the architectural exploration has to emerge and has to give differentiations and alterations to these some how restricted, nature given parameters. And the design has to donate to the building a distinct, unpredictable character that responds to the individual inspirations of exteriorities and interiorities as it is always and ever the case with good architectural design, no matter if green or not. Wood as natures and mankind's oldest and emerging building material is an ideal one to be part of it, because it inherits a well pragmatically and poetic quality. However in regard of it's global potential it has yet to be introduced to a wider audience by applying it to a wider range of architectural building types, like the train stations for the Expo 2000 in Hannover of Despang Architekten.[12] However it is most important to promote wood in terms of its organic human attitude in the domestic building typologies. The rental "treetop condominiums" by Despang Architekten in Hannover / Kirchrode is an example of using HMT-wood in a building type that is commonly and traditionally in that geographically area not familiar with wood.

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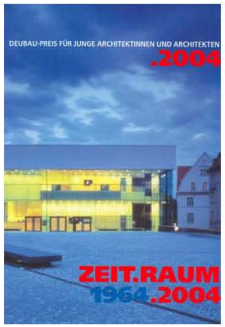

In this case the sentimental notion of wood as the structural material of a tiny half timbered house that was previously occupying the lot is used to code and accentuate the areas of most intense human occupation, blending the space between the private and the public. Wood is by this transformed from a structural literal level to an abstract enveloping one. Still most effective is wood, when being closest personalized in touch with its owner, like in the case of the "wooden feathery extension" project by Despang Architekten [13], again in Hannover/Kirchrode. Adding a one room extension and a canopy to an existing old house creates a new sense of place and a transition of space from the inside to the outside. In this case the physical capabilities of camballa wood enabled a concept of structure and architecture to blend into each other as integrative parts and work primarily with light and shade as major architectural components, like bamboo does in the natural world. This project was a case study starting point and prototype for the continuous exploration of the more responsible HMT technology by Despang Architekten and was followed by the thermo wooden louvered house in Kirchrode [14].

Worth examining is once again the calculated notion of comfy and warm environment, created by the materials unique physical quality itself. The decades of the 1950´s and 1960´s, being influenced by the design of northern Euro countries, can be strategically seen as predominantly taking advantage of this. Instead of staying a local phenomenon, this sensualist driven by materialism emerged to a global extent and excitingly down to the ordinary average single family house, to be clearly identified in different parts of the world. As one personal example, the house of architect Despang and his family in Hannover/Germany, which was designed by local Architect Friedrich Lindau [15] in 1958 with it's cathedral ceiling, windows and renewed matching HMT wooden brise-soleils out of brazil pine , shows the same in it's time innovative influencing forces as several houses of the same time in Lincoln/Nebraska/USA, as another similar location officially not showing up very often in the encyclopedia of world's famous architecture. Although as the 1950´s domestic case study project's from the US west coast show, that not limited to this material, the notion to build with wood almost automatically tended to result in an attempt to relate to natural conditions as well in the overall architectural concept, as blending the boundaries from the inside to the outside, sun gaining floor to ceiling windows to the south and ventilating courtyard as "low technology" natural cooling devices. Represented by the tropical hardwood resembling covers of the recent books about the west coast phenomenon of the "Eichler homes" [16] or about the more vernacular " ranch homes" [17], prove this indication of a material being emotionally strongly associated with that section of progressive housing for a wide range of the population in the US.

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5. Execution / Conclusion

Research at the College of Architecture at the University of Nebraska-Lincoln and the practice of Despang Architekten in Hannover will ongoing investigate in the future potentials of HMT-wood. The heritage of the progressive Midwestern mid-century homes dominated by similar rich "golden wood" is an ideal field of research. Like with the analysis examples from the past, which have been created out of the notion of their time only and which will not fit any more to the contemporary technologically and architecturally demand, the goals and objectives for this are to trace the spatial, tectonical, environmental and social potential of wooden buildings into the future.
This has to be achieved while incorporating modern technology as HMT. One might object to this concept and not worth exploring this realm of wooden building innovation in the USA, as this country has the history of the largest energy consumption worldwide, mainly based upon bigger than ever cars but overall, even more devastating of houses getting designed to be most eco-harming than ever. But this is precisely the reason why to point out the potential of dealing with it differently, especially in an area where there are perfect natural resources as they are plenty of sun and wind . Rising energy costs might on both continents give the chance to receive a wider public audience and interest, making a virtue out of the dilemma and introduce progressive architectural dimension, including innovative low technology like HMT once more to the citizens of cities, community's, neighborhoods or just the single middle income family.

In collaboration with the involved faculty at the College of Architecture at the University of Nebraska-Lincoln, this issue will be addressed more intensively in the future architectural education.
Projects to be resolved are by intention small, to give the students a chance to get into a complex depth, but strongly relate to improve the domestic Midwest way of life in various ways, as opposed to creating huge corporate architectural visions. With requested support of the HMT community in the next semester a studio will investigate the design of a domestic postfossil community and current Graduate student Alissa Piere uses her childhood experience of having grown up close to the Winnebago Indian Reservation north of Omaha/Nebraska to re-think their domestic reality. For all students it is a process to get back to their roots, their ancestors not long ago by physically protecting from the north wind and opening to the south sun instinctively knowing how to survive in the harshness of the prairie plains, in this case pretty soon literally, building trees. When it comes to the point of creating truly contemporary ways of living environments in the beginning 21st century, this generation will be unsentimentally looking forward, in a highly advanced modern global world, seeing the tree as a metaphor for creating self sustainable and re-rooted architectural organisms. Alissa discovers the long tradition of HMT in the American culture, as the Indians were strengthening the peaks of their arrows by putting them into the fire, just as long, that they did not burn but rather became stronger than stone……

Professor Martin Despang / Januar 2006

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