

DAYLIGHT &
ARCHITECTURE
MAGAZINE BY
VELUX

SUMMER 2006 ISSUE 03 TEXTURES 10 EURO

DAYLIGHT & ARCHITECTURE MAGAZINE BY VELUX

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DISCOURSE BY FERNANDO MENIS

Every building is inextricably intertwined with the site where it is located. The section will follow the topography of the terrain, and the ground plan will be suitably aligned to the natural light. But what is more important is that the location also influences the choice of materials, the appearance of a building and the actual texture it finally possesses.

If an architect takes these factors into account in his work, while remaining aware of the special features displayed by the surrounding area, natural characteristics become the fundamental values of architecture which does not subordinate itself to the current vogues or passing trends. Each project makes a fresh start though a process of analysis and reflection on these basic underlying values.

The architect must have some idea of what kind of architectural space he wants to create. Does he want it to suggest an invisible influence, radiate an aura of peace or evoke specific feelings? Or does he want to proclaim a visible influence and thus make it a more complex place to live in but with a more powerful form of expression? Whatever decision is reached, in both cases the use of light and the final texture of the building will determine the architectural result, which should be in harmony with the use to which the building will be put.

Light and texture are inseparable, forming a conceptual unity. The fall of light into a building depends to a large extent on the materials used and is therefore a factor that should be taken into consideration when choosing these materials. The right choice of materials can exert a powerful influence on the way in which an architectural space is perceived. Ribs and wave shapes in the facade, seams of light in the floor or intermittent lighting points make light an architectural element that harmoniously complements the actual texture of the building. However, it is not only light and its presence in buildings and on surfaces that is important; lack of light and the presence of shadows are of equal relevance. Although light and shadow are complete opposites, they should be combined to generate an overall effect.

Texture, however, not only depends on the type of material. Structures, proportions and the arrangement of elements also determine the texture of any body. In architecture, this body is the building – and the arrangement of its elements is the expression of common sense.

Fernando Menis

Portrait by Torben Eskerod

Read more about the work of Fernando Menis in the article 'Megalith circle in the desert', starting on page 14.

VELUX EDITORIAL

WELCOME TO DAYLIGHT & ARCHITECTURE MAGAZINE BY VELUX

In a time of digital design, several architects take up the challenge of exploring the vast possibilities of bringing forward virtues in well-known materials by new means of constellation, structuring and cladding. After decreasing materialization and abstraction of surfaces during Modernism, architecture is currently rediscovering the texture of materials as a property that has a strong influence on the atmosphere of spaces and the 'aura' of objects. Surfaces are no longer treated as purely two-dimensional, but become three-dimensional in their own right, and in doing so become more susceptible to the interplay of lights and shadows. We are proud to present the MAGMA conference centre on Tenerife, as an excellent exponent of this tendency. Through the exceptional use of texture varieties in one building material, the ensemble brings a flow of masses to life by the distinct daylight on the Canary Island.

Coming from issue # 2, which dealt with how housing turns into homes, how processes and products turn out to become living environments, we now go a step closer to look at our physical surroundings. In the issue of Daylight & Architecture at hand,

we focus on 'Texture'. New ways are constantly sought and trod in the search of creating optimal living and working environments. We invite you to see traditional materials, seen through a different optic: How does the thermal insulation of a polar bear actually work? Can ivy be used as a façade material? In Graz, the InnoCad office casts new light upon building in a historical context with an active use of materials, thus demonstrating a different texture in the exteriors as well as in the interiors.

In VELUX we seek to have a constant dialogue with professionals about the progress in construction business and architectural profession. The magazine at hand is one example; another example is our engagement with the European Association for Architectural Education, EAAE. Since 2001 VELUX has been a sponsor of the EAAE prize 'Writings in architectural education'. In the VELUX dialogue article, Per Olaf Fjeld looks into the topic of the 2003–2005 edition with the theme of 'New Knowledge'. The current prize edition 2005–2007 deals with representations in architecture, Communication – Meaning – Visions. In these reflections and perspectives, we hope you will enjoy reading # 3.

SUMMER 2006 ISSUE 03

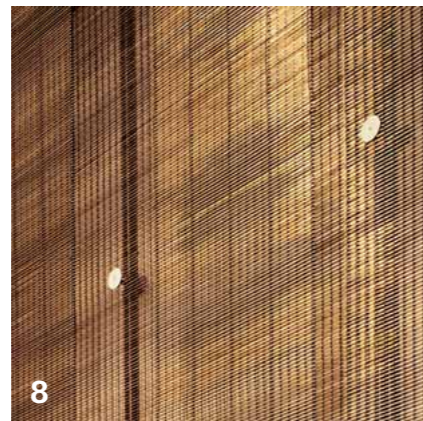
- 1 Discourse by Günter Behnisch
- 2 VELUX Editorial
- 3 Contents
- 4 Now
- 8 Mankind and architecture
- Architectural Weaving**
- 14 Textures
- Congress Centre 'Magma', Tenerife**
- 32 Reflections
- Natural Surfaces**
- 38 European Light
- Scarborough, Yorkshire, England**
- 42 Daylighting details
- Light and Materials**
- 48 VELUX Insight
- A dress for special occasions**
- 56 VELUX Panorama
- Sunny Space in the Attic**
- Monolith on the Mill Pond**
- Embedded In Nature**
- 63 VELUX Dialogue
- Writings in Architectural Education**
- 68 Books
- Reviews**
- Recommendations**
- 72 Preview

CONTENTS



NOW

The new **Cathedral in Oakland** and the **headquarters of the Barcelona Waterworks** are both buildings which embrace the enhancing effects of daylight. Jeroen Hoorn designs a **pavilion made of glass blocks** in gabions, Mario Bellini and Rudy Ricciotti spread a delicate **glass veil over the Louvre's Visconti courtyard**. And more: The newly constructed 'Camera obscura' of Madrid, the **Chamber of Commerce** by Rafael de la Hoz.

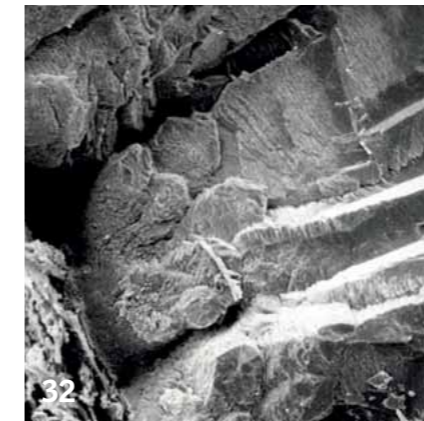
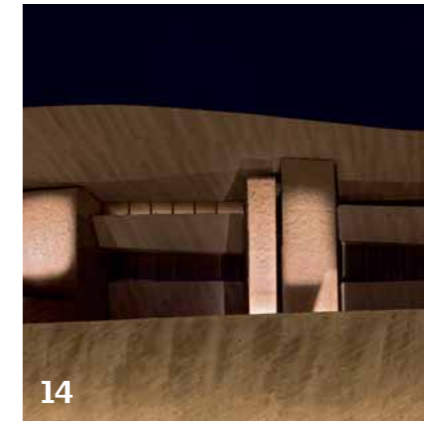


MANKIND AND ARCHITECTURE ARCHITECTURAL WEAVING

Weaving, one of the oldest cultural techniques known to man, is of outstanding importance to architecture. This special association was recognized long ago by the German architect and theoretician **Gottfried Semper** (1805–1879). **Peter Blundell Jones** looks at how Semper's theories on textile architecture have evolved since the mid 19th Century, and at the links existing between weaving and architecture today.

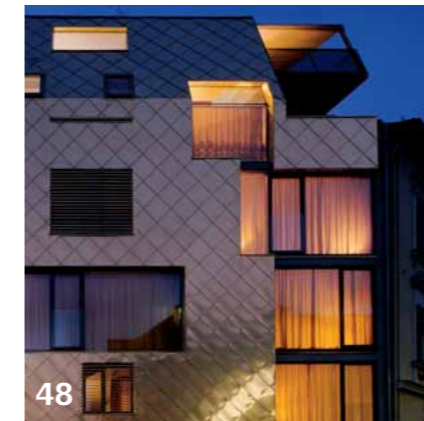
TEXTURES CONGRESS CENTRE 'MAGMA', TENERIFE

The desert sands of southern Tenerife are the site of an unusual congress centre: MAGMA, the work of local architect **Fernando Menis**, comprises concrete cubes which appear to have been hewn from the island's cliffs of lava, and a corrugated roof made of fibre cement panels. Light infiltrates the interior of the building through narrow gaps in the walls and roofs.



REFLECTIONS NATURAL SURFACES

What do ostrich eggs, hazelnut shells and polar bear skins have to do with architecture. Actually not as little as one might assume, according to **Dr. Udo Küppers**, a scientist at the University of Bremen. His article looks at the bionics of natural surfaces and highlights some of nature's "inventions" which could become models for architectural components – or have already been used as such, for example in transparent heat insulation systems.

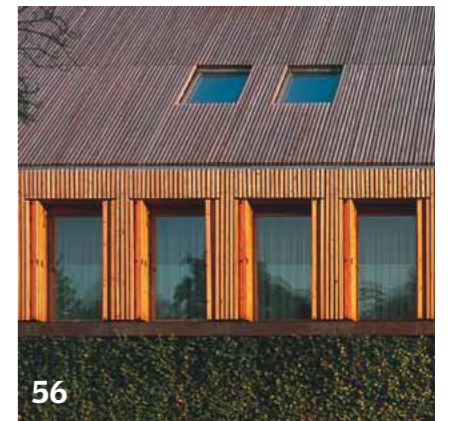


VELUX INSIGHT A DRESS FOR SPECIAL OCCASIONS

By adding a shining gold-coloured facade made of copper shingles to their residential and commercial building at the edge of Graz's old quarter, the young architectural bureau **Innocad** created an architectural landmark of national note. The building's 'Sunday best dress' communicates with its environment on many different levels: It picks up the yellow colouring of the adjacent historic buildings and at the same time provides an interpretation of the logo used by the architectural bureau, which has moved its offices into the ground floor.

VELUX PANORAMA

Natural stone walls a metre thick juxtaposed alongside delicate exterior and interior constructions in steel and glass: the Czech architect **Lucie Kavanova** explored the theme of opposing extremes in her conversion of the **Kotrč mill** for residential use. Also: The Seehotel on the shores of Lake Neukloster, an ensemble of old and new buildings set against a rural backdrop, has been 'rooted' in its environment by architects **Nalbach and Nalbach** by dense ivy growth.



The things that make architecture tick: events, competitions and selected new developments from the world of daylighting.

CHRIST THE LIGHT CATHEDRAL IN OAKLAND

The 'Christ The Light Cathedral' in Oakland, near San Francisco is scheduled to be completed by the beginning of 2008. The new construction by Craig Hartman from Skidmore, Owings & Merrill (SOM) replaces the historic St. Francis de Sales Cathedral which was destroyed in 1989 during a severe earthquake. Its name 'Christ The Light Cathedral' goes back to the document, 'Lumen Gentium' which was published in the 1960s by the Second Vatican Council and begins with the words 'Christ is the Light of all Peoples'. Hartman raised it to the agenda: 'Ultimately, this Cathedral, like those throughout history, is about the consideration of light as a sacred phenomenon – and the poetic introduction of light within the spaces of worship. The intent is to use light to ennoble modest materials – primarily wood, concrete and glass', he writes.

As with many places of worship in the Pacific area, the new church is predominately constructed from wood. Its arches are up to 40 meters high and their internal walls are shaped like two spherical shells. Lamella-like wooden panels are inserted between the curved beams. They gradually slope from the bottom to the top and make the wall appear ever more translucent. The external weather-proofing of the new cathedral comprises two conical segments from glass with ceramic glaze which are mounted at a distance of one to three meters in front of the wooden structure. At night, the light from the church streams through the panel construction and into the open. The cathedral is transformed into a gigantic lantern, which shines its light far over the water. The church ship's flat roof, the 'oculus' and alter wall are made up of diagrid constructions with aluminium coating. The lower deck's panels are angled, allowing light to stream through their openings in the direction of the alter wall.

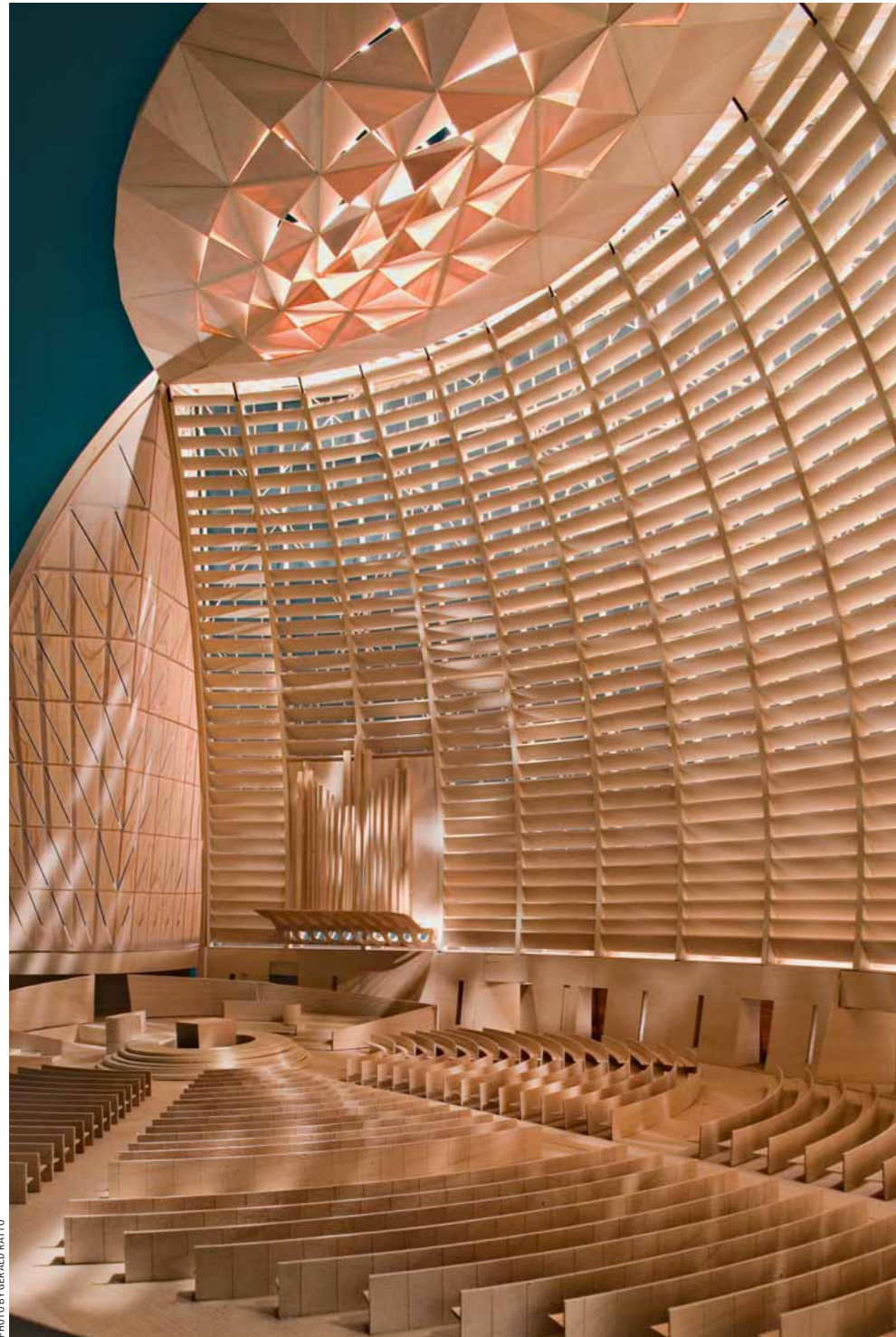


PHOTO BY GERALD RAITO

TORRE AGBAR IN BARCELONA

Even when it is often assumed: Jean Nouvel's new office tower in the Catalan capital received its name not from the Arabian ruler. 'Agbar' is nothing but an acronym for 'Aguas de Barcelona', the municipal waterworks. The designers would like the structure to be understood as a symbolic 'fountain' from glass, light and air. Of course, the Barcelona inhabitants saw this differently: Since the commencement of works in 2002 they accompanied the building with partially amused, partially affronted comments on its phallic shape. The parallels to the "erotic gherkin" of SwissRe by Norman Foster are unmistakable and may even be intended. Different to this building Jean Nouvel's tower on Avenida Diagonal unfolds a play with light reflections in all colours of the rainbow. Façade modules from varnished corrugated aluminium sheets in 25 colours form the inner façade layer; glass lamellas with four different degrees of transparency, which are attached externally with various inclines and angles, let the tower seemingly 'spray sparks' in the sunlight. The lighting atmosphere in the interior is decisively defined by the small windows, which cover the entire façade irrespective of the storey heights like an abstract pixel pattern. Their light is replicated in the reflective floor and ceiling panels or is, like in the entrance area, softened by translucent screens.



PHOTO BY ROLAND HALBE

'This is no tower, no skyscraper in the American sense [...]; it rather is a fluid mass, which has just oozed out of the ground, a geyser under a constant, measured pressure.' Jean Nouvel

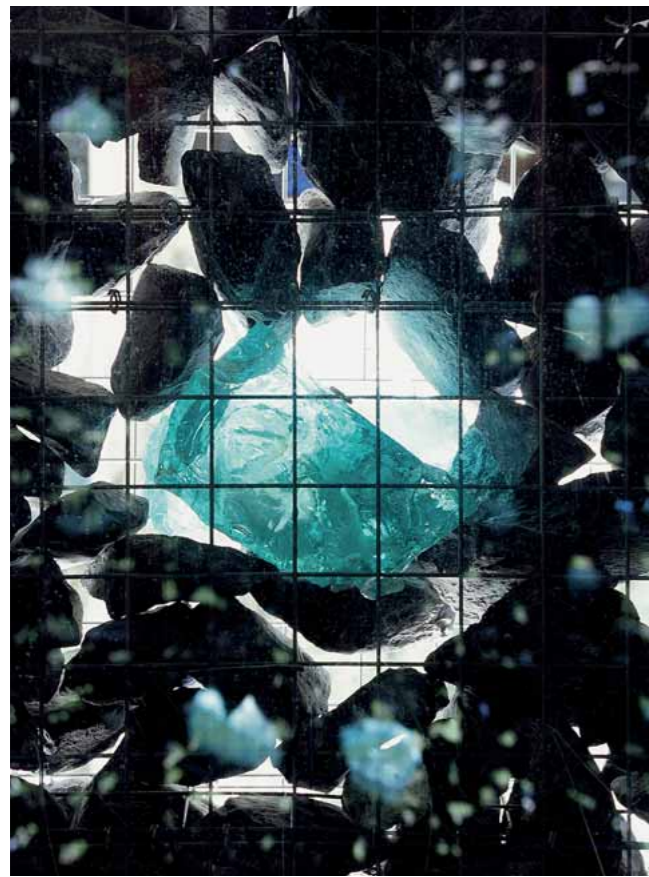


PHOTO BY WILLEM VAN DET

GLASS PEBBLES IN WIRE BASKET

The building "could not allow itself to have a backside", comments Jeroen Hoorn on his design for a new fast food restaurant in Rotterdam's centre. The motorized and pedestrian traffic flows around it from all sides; adjoining are an underground train station and a busy skater park. Hoorn designed "a solid little box that's hip enough for the skaters and that echoes the robust styling of the surrounding offices from the late 70's". The client had suggested a façade from gabions, a solution he was already familiar with from landscape architecture and which had been applied by Herzog & de Meuron in their vineyard in Napa Valley. In collaboration with the experts from the Materia material database Hoorn searched for a suitable filling for the wire baskets. He chose a mixture of asphalt-coloured limestone and large glass chunks, which lets the coarse-grained façade structure appear even more impressive in counter light. The glass elements

break through the exterior wall like 'cat's eyes' and scatter the sunlight into the interior. The climatic envelope (and insect protection barrier: gabions are preferred nesting places for vermin of all kinds) consists of floor-to-ceiling glass panes with cedar wood frames on the gabions. At night, says Jeroen Hoorn, the building starts to "glow up like a heap of hot coals".



PHOTO BY MARGHERITA SPILUTTINI

MUSEUM IN THE HELDENBERG

They still exist all over Europe: memorials paying homage to the empires of previous decades, which are for most contemporaries nothing but gloomy walls with pathetic gesture. The Austrian representative for this genre is the 'Heldenberg', which was built from 1849 on in the Lower Austrian Kleinwetzdorf. Field marshal Radetzky is buried here, eponym of the famous march by Johann Strauss, and several other important military figures.

With the three-winged, temple-like building the city fathers aimed for great things in 2005: A new exhibition as well as a new museum were to be realized under the title 'Time Travel Heldenberg', paying homage to the town's history. Peter Ebner and Franziska Ullmann from Vienna won the architectural competition for the new museum. Externally the building is impressive due to its extreme restraint; it is only visible as a cantilevered, elongated entrance building constructed from fair-faced concrete

and glass. The larger part of the exhibition area is located underground, on the same level as the crypt of fallen military figures. Nevertheless the spaces do not express the emotiveness of the existing building: Ebner and Ullmann designed an all white, repeatedly folded interior landscape, where daylight plays the main role despite the underground location. It always enters the space indirectly, through roof elements, which penetrate the hill surface, partially arriving centrally, partially as streaks of light along the outer walls. Light leads the visitor through the museum; in the interplay with the continuously changing room heights and widths. Ebner and Ullmann deliberately forego the division of the museum into various cabinets. They simply organize the exhibition route through a subtle folding of the ceiling, walls and partially the floor, which was tested during the design process with innumerable working models.



PHOTO BY RUDY RICCIOTTI ARCHITECTES/STUDIO MARIO BELLINI

A VEIL FOR THE LOUVRE

'The Visconti Courtyard must not be concealed!', Mario Bellini and Rudy Ricciotti substantiate their winning design in the competition for the new Museum for Islamic Art in Paris. It will be realized in the Visconti Courtyard in the south wing of the Louvre, which with its classical sandstone façade is considered as one of the most beautiful courtyards of the entire complex. In order to maintain its ambience, the architects suggest distributing the complete room program of the new museum over two basement levels. A visual link to the Visconti Courtyard located above is realized with openings in the ceilings. The exhibition areas are covered with a light-weight roof structure, which is supported by four filigree steel columns only. The roof's 80 centimetre high spatial load-bearing system is clad on both sides with a composite, its surfaces being finished with thousands of small glass lenses. This 'veil' functions as a weather protection for the room located below, but

is also filters the light and refracts it into the prismatic colours. This effect bathes the exhibition room in a diffuse and colour-intensive light, which favours the visitors' comfort as well as the conservation of the exhibits and cast a positive and stylish light on the Islamic Arts.



PHOTO BY ROLAND HALEE

CAMERA OBSCURA

In Spanish the word 'Cámara' means not only 'chamber' or 'room', but also 'camera'. Based on this linguistic (and semantic) relationship, Rafael de la Hoz explains his design for the new Madrid chamber of commerce. The 'Cámara de Comercio' is situated on a narrow site between an arterial road and the motorway; a park adjoins at the side. De la Hoz makes all three of them visible for the visitor, by opening up the building (or in his terminology: the 'camera') towards the exterior over three multi-storied glass façades. Additionally daylight enters the central atrium via a glass roof, which is supported by an enormous girder grill from reinforced concrete. Behind every one of these three 'lenses' of his camera de la Hoz positions an object as 'room in room': In the west, towards the motorway, a solid metal cube penetrates the glass façade. In the south, in the direction of the park, a glass cube projects towards the exterior. The architect achieved his most impres-

sive spatial composition in the east: As if by magic a stone cube seems to be hovering in the four-storied foyer, which is only accessible via a narrow bridge from the building's centre. The structure was completely suspended from the structural concrete framework of the roof; it appears massive, but consists of a steel skeleton, which is clad with thin alabaster panels. In the cube's interior, a thin half-light prevails during the day, in which the stone structure is well emphasized. At night, the impression is inverted: The stone cube, which only just appeared grey and nondescript, becomes suddenly an over-dimensional luminous element, which radiates through the glass façade far into the landscape.



ARCHITECTURAL WEAVING

Above The Tatami mat is the most important item of soft furniture in the traditional Japanese residence and, at the same time, represents the most important unit of measurement in ancient Japanese architecture. Its length (ken) varies from region to region between 170 and 191 centimetres.

Text by Peter Blundell Jones.

In his book, 'The Four Elements of Architecture' (Die vier Elemente der Architektur), Gottfried Semper placed the art of weaving, as one of the fundamental elements of architecture. Weaving (Latin 'texere') has maintained its importance as an aspect of building up to the present day, even if only in the metaphorical sense described by Peter Blundell Jones in his article. He investigates the myths and customs of weaving in human culture and delves into people's fascination for woven surfaces which persists to this day.

WHEN GOTTFRIED SEMPER presented his argument about the four elements of architecture he was already fascinated by the question of polychromy: the claims that antique buildings had been finished in highly coloured ornament. He was also reacting against claims that architecture originated in pure construction, particularly in the masonry wall. The intellectual context was the debate about classical antiquity and supposed origins running back through Egypt and Assyria, with sideways references to China. Archaeology and anthropology were still in their infancy, so ideas about primitive origins were highly speculative. Semper presumed that the hearth was the starting point, first element and moral base. Elements two and three were the mound and the roof: mud or masonry being the basis of the first, carpentry of the second. This prepared the way for the fourth element to which he gave most attention: the enclosure made by the Wandbereiter through the process of weaving. According to Semper, because the enclosing wall had originated in a hurdle or a carpet, it was a Bekleidung and should bear the noble memory of this origin. This not only opened the way to a revival of applied ornament in colour, but made it a moral duty, and suggested that an appropriate decorative vocabulary might be inspired by a study of weaving. Semper was working at a time when, as Ruskin put it, 'ornament is the principal part of architecture', and it is perhaps significant that Semper's theory was revived during post-modernism, when justification for applied cladding was again being sought, and a new interest had arisen in the persisting memory of past technologies, for example in useless applied quoins or keystones.

Semper's argument about the primacy of cladding is hard to support today, at least as a general principle. Certainly there have been tents in many parts of the world, and houses of the Amazonian rainforest like the Tukanoan Maloca would have warmed Semper's heart as the perfect proof of his theory: a timber framework covered in mat-like constructions of plaited grass. But there are also many mud and masonry constructions where the earthy material is primary, and the wall thick and solid. In some cases, through vaulting, the wall even becomes the roof. There is plenty of precedent, too, for the Gothic Revival obsession with spanning of openings, let alone Louis Kahn's famous observation that the brick wants to be an arch.

East Asian architecture seems at first a much better support for cladding theory, since in traditional Chinese, Japanese and Korean buildings the walls are usually indeed cladding, filled in after the structure is erected and allowing for many kinds of spatial layering. But closer study does not support the idea that the cladding is in any way the primary element: the primary construction is evidently carpentry, it is a building of roofs. The whole basic expression lies in the layering and interlocked jointing of the complex wooden roof structure, which dictates both the curved outer forms and the elaborately bracketed corners (fig 3). The carpenter is clearly the boss, and is the primary actor in building rituals, of much greater status than the mason who only builds the base. The building stands clear and open on its columns before the infill partitions and outer walls are added: the cladding is therefore secondary. There is, however, a strong differentiation between the wall of cladding—die Wand—and the solid wall—die Mauer—of mud or masonry. The latter is used in China and Korea as the outer property boundary wall, broken only by a roofed gate. Its strength and solidity keeps strangers and contagion out while the actual wall of the building, which may in places be no more than a paper screen, remains a mere filter between house and court or garden. The hot, humid summer climate brings a need for through airflow and for a finely adjustable barrier, but the effect of the layers of screens and blinds also produces a subtlety of spatial layering with strong social and aesthetic consequences. Recent examples from Japan show that this tradition persists in some places as strongly as ever. Traditional Japanese house planning revolved around the tatami mat (fig. 1), an archetypal work of weaving the size of a bed which sets the house's module. The paper-clad sliding screens or shoji which stand in as their vertical counterpart possess a woven quality, particularly with their gridded geometries and modular frames. Modern examples reveal that the availability of glass has not altogether displaced the desire for the translucency and play of light which the shoji brought. Also woven in traditional Japanese architecture are bamboo fences: those of the Katsura Palace are surprisingly simple yet highly refined in their detail. Here is strong evidence for Semper's claim that the logic of technique gives identity to the form.



The Sago palm is the main building material of traditional Papua New Guinean dwellings. Posts are made from the trunk of the palm, wall shingles and the roof from the leaves, and floors from the skin of the trunk.

PHOTO BY YOSHIO KOMATSU

THE ORIGINS OF WEAVING

A knowledge of modern anthropology would have both undermined and substantiated Semper. The primacy of the hearth, so obvious for a northerner, is in many warmer climates far less important. The focal nature of the fire for Native Australians, on the other hand, would lend strong support to Semper's claim for his first element, and the interlocking of a few branches to make a quarter spherical enclosure as a shelter in front of it could surely have been taken as a form of weaving, a making the first wall for the first house as die Wand, not die Mauer. The artefacts and crafts of the Australians also reveal types of weaving that probably existed long before the invention of the loom, for hunter-gatherers need string. They use it for lashing things together, for tying on ornaments or garments, and even for making ceremonial objects. It could be made from human hair long before sheep were domesticated, herded, and exploited for wool. Native Australians could also make themselves shoes by plaiting grasses. Just as important as the choice of material was the technique of joining: finding ways to interlace the threads which turn a linear one dimensional material into a two- or three-dimensional artefact. Knots are presumably ancient in human history, perhaps much older than the 10,000 years of agriculture and closer to the 100,000 years of language. They require spatial understanding as well as manual dexterity, though we remember how to tie our shoe laces largely as an action. The interlacing patterns of Celtic art with their under- and over-crossing lines are presumably a memory of embroidery techniques, just as later knot-gardens were derived from Turkey carpets. All this confirms that Semper was on to something important.

He would doubtless have enjoyed some of the rich mythologies of the loom that have since come to light. In Marcel Gri-aule's famous book on the Dogon, reporting a long narration from the tribal elder Ogotemmel, weaving plays a very major role. Weaving for them is a male task, spinning a female one, and the combination is like making children. The alternating black and white squares of a woven rug are said to represent an agricultural landscape as seen from above, divided into squares. It thus reflects the essential order of ploughing, the basis of settled community, which first imposes an artificial geometry on the natural topography and is thus a primary

symbol of culture. The warp and the weft, like ploughing, set up the right angle, which is reflected again in the order of the square, orientated house plan, and in the symbolic order of the village. The interlacing of warp and the weft represents the conjugal act, the coming together of male and female, and the various actions of the weaver represent different aspects of the Dogon origin myth. Dogon family houses, built of mud, have facades presenting a grid of niches as a memorial to the ancestors (fig. 4), and the ideal house should have ten rows of eight, representing the genealogy of the family stretching back to the primordial couple. Ten is the number of the fingers, eight the number of original families, and eight is twice four, the number of the basic grain types which are disposed in the four corners of the perfectly square granary, which is also a model of the universe. Agricultural land and houses are laid out on modules of feet or cubits involving the same numbers. The woven rug exerts its most representative role as a funeral pall, and it should have eighty threads in each direction, for when the dead body is wrapped in it: 'it is a symbol of life and resurrection. In it the dead man is folded for a short time, like a foetus in the womb, so that he may be immersed again in the web of the living and in the germinating fields.'¹

In oral agricultural cultures such as the Dogon, the loom was one of the most sophisticated technologies, along with the making of pots and the working of iron. Such skills not only produced the essential artefacts of human culture, but also demonstrated a kind of magic; the undifferentiated mass of raw fibre transformed, through the imposition of practical geometry, into a beautiful square of cloth. The techniques needed to be remembered and carried down through the spoken word, and their origins needed to be located within the more general origin myth. It is hardly surprising, therefore, that they carried such a huge interlocking symbolic load. Although the ideas seem primordial, the details are far from universal. The loom is equally a symbol of culture for the Kabyle of Algeria, for example, but it is predominantly a female technology. In his famous structuralist analysis of the Kabyle House, Pierre Bourdieu presents the loom as a primary representation of culture. It gives its name to the back wall of the house, the loom wall, but since it is inside the house, the predominantly female space, it belongs to the women. Its use belongs to the dark

Below (top) The timberwork of an ancient Korean temple reveals the high art of woodworking in the old, east Asian cultures. Skeleton structures like these provided the basis for the development of lightweight, open-worked or plaited external wall claddings.

Below (bottom) Front view of a Dogon dwelling house. In the same way that the interweaving of warp and weft symbolises the joining of man and woman in marriage in the Dogon faith, the niches beside the entrance represent the occupants' family tree.

Right Wattle and daub wall filling of a half-timbered house. This too consists of coarsely interwoven, pliant branches, but is subsequently concealed behind a thick layer of clay, straw and plaster.



PHOTO BY PETER BLUNDELL-JONES



PHOTO BY PETER BLUNDELL-JONES



PHOTO BY JOSEF STUETER

especially significant in view of Bourdieu's theory that geometry originates with the body, and in the basic bodily actions of moving forward and backwards, to left and right or up and down.³ Not only does this provide a pre-Cartesian account of the three dimensions in architecture, it also suggests a basic role for what one might call choreography, the coordination in space and time of many bodily movements. The primitive theatre in which Native Australians carried out their presentations of the Dreamtime myth in their all-important initiation rituals was no more than a marked out piece of desert with a few windbreaks and strategically placed piles of firewood, yet it served as the necessary frame and definer of roles for the whole pageant: as a marker for the choreography. The event that brings this idea of choreography together with weaving and the knot is dancing around the Maypole: each dancer holds a strip of cloth attached to the central pole, and they weave in and out, knotting their threads in a particular pattern. It is soon unravelled again, but for a moment the dance is shown to have a physical product: moving bodies recording their movement in a woven product.

THE RULES OF THE GAME

Nowadays the word 'product' is abused in many ways, but originally something had to be 'produced', and the attraction of a woven rug or a basket seems to lie in the visible order of its construction. Not only does the ordering of materials confer a geometry: it allows choices in the layerings of materials, changes of colour etc. Variations in the action of making present the opportunity for ornament, which arises as a form of play by the maker, but it must happen within the rules of the game. The patterns in traditional hand-made carpets are limited by the size of thread and the type of stitch, for example, and by the judicious use of a limited range of dye colours. William Morris recognised all this when, among other crafts, he attempted to revive the art of weaving, stressing that the weaver must make 'weaver's flowers' not 'painter's flowers': the product must always be geared to the material and technique:

'Do nothing in it but that which only weaving can do, and to this end make your design as elaborate as you please in silhouette, but carry it out simply; you are not drawing lines freely with your shuttle, you are building up a pattern with

part of the year, therefore related to the dark, wet, female side in Bourdieu's series of oppositions. The Kabyle loom relates to the female role and the male protection of women: 'It is in front of the loom wall, facing the door, that the young bride is made to sit... When one knows that a baby girl's umbilical cord is buried behind the loom, and that, to protect a maiden's virginity, she is made to step through the warp, from the side facing the door to the side next to the loom wall, then the function of magical protection becomes evident... From the standpoint of her male kin, the girl's whole life is summed up in the successive positions she symbolically occupies vis-à-vis the weaving loom, the symbol of male protection.'² The stepping through the loom as a kind of symbolic threshold is

a fine rectilinear mosaic. If this is kept well in mind by the designer, and he does not try to force his material into no-thoroughfares, he may have abundant pleasure in the making of woven stuffs.⁴

In the same lecture there is a hint of real personal experience: ‘... neither do I call the weaver’s craft a dull one, if he be set to do things which are worth doing: to watch the web growing day by day almost magically, in anticipation of the time when it is to be taken out and one can see it on the right side in all its well-schemed beauty.’

WEAVING IN ARCHITECTURE

Apart from its presence in various kinds of cloth used for clothes, bedding and furnishings, weaving appears in traditional rural architecture in three forms: the making of hurdles and fences, the use of similar techniques for the infill of timber framed walls, and in thatching, particularly the finishing and edging. Old lashed fences seen now only in open-air museums were particularly beautiful in contrast with the concrete posts and barbed wire we are usually faced with in the country today, and depended on a precise knowledge of the type and age of trees to be used. The infill in timber frame (fig. 5), made of intersecting horizontal and vertical elements, gained strength from the tensions in its interlocked materials, but was then lost to view by being plastered over on both sides. The woven nature of thatch is most evident around the ridge and edges where everything has to be tied-in and weatherproofed. The strings used to secure it are often visible, lending themselves to ornamentation, and a special quality is given to thatch by the process of trimming to finish the forms, like a haircut.

Weaving in modern architecture in the strict sense is much rarer because of the general decline in handcraft. We see the occasional use of baskets, such as for the balconies of a recent seminary in Stuttgart, and their persistence as the containers under hot-air balloons shows that in lightness and strength they still compete. But rather than being employed literally, weaving is more persistent in terms of underlying ideas. Not only was the Semporian tradition of cladding carried on by Wagner and Loos, but Frank Lloyd Wright made frequent references to the warp and weft as the basis of a planning geomet-

¹ Griaule, Marcel *Conversations with Ogotemmeli*, Oxford University Press 1966, p. 79. (Original French title *Dieu d'eau, entretiens avec Ogotemmeli*)

² Pierre Bourdieu, *The Kabyle house or the world reversed*, in his book *Algeria* 1960, p. 137.

³ Pierre Bourdieu, *The Body as Geometer*, in his book *Outline of a Theory of Practice*, Cambridge University Press 1976.

⁴ William Morris, *On Weaving*, from *The Lesser Arts of Life* 1882, quoted in Christine Poulson, ed. *William Morris on Art and Design*, Sheffield Academic Press 1996, p. 79.

try which also organises and engages materials. The architects of Team Ten, particularly Josic Candilis and Woods, created a series of works on grid plans which were compared with a mat or tartan. Alvar Aalto made an early return to lashed and woven plant materials in his Villa Mairea of 1937, and went on to invent many kinds of gridded wooden structure, especially for space-defining suspended ceilings. Josef Frank, especially in his Swedish career after 1934, excelled in the design of textiles and employed rattan and cane for furniture. If weaving is taken in a broader sense to refer to material layers that are perforated or translucent, like the Japanese shoji or the veiling woodwork of the Arab harem window, there is a great richness of modern examples, including the kind of façade layering developed by Egon Eiermann and further exploited in the buildings of Günter Behnisch. Some of these layerings are visual, others environmental, and it is a commonplace that the exterior of a building might be considered like clothing: a raincoat to keep out the rain, a pullover for insulation, and so forth. Perforated metal grids and screens, which produce the visual effect of a weave without being woven, have seen widespread use in the last 20 years, notably by Jean Nouvel. Herzog and de Meuron went further to create facades in large-scale mimicry of hurdle-like form with their signal box Auf dem Wolf of 1988–95 (fig. 7), but this was just one theme among many in their work about redefining the nature of facades, always with a consciousness of the effect of materials. Cable-nets and grid shells, as pioneered by Frei Otto and his Lightweight Structures institute (fig. 8), are like woven material in the sense that they have a warp and a weft, are flexible, and have forms dictated by tension forces. Cable-nets particularly are like spiders’ webs, a reminder that the spider may be nature’s lowliest weaver, but it can produce material of great complexity and beauty, and it does a kind of ballet in producing it.

Peter Blundell Jones was trained as an architect at the Architectural Association in London, from 1966 to 1972. He has written extensively on architectural history and theory, and has published books on Hans Scharoun, Hugo Häring, Günter Behnisch, Gunnar Asplund, the Graz School of Architecture, as well as the anthology 'Modern Architecture through Case Studies'. Since 1994, Peter Blundell Jones has been a Professor at the University of Sheffield.

Below top Stainless steel fabric belongs to the recurrent textures in the works of Dominique Perrault. The Velodrom in Berlin is almost entirely clad with this material. Only a man-high glass façade separates the seemingly hovering silvery disc from the ground.

Below (bottom left) In their signal box in Basel (completed 1998), Herzog & de Meuron interpreted the theme of weaving with considerable freedom. The symmetrical building is wound around with copper bands which turn into the horizontal position near the windows in order to let light into the building. At the same time, direct sunlight is cut out by means of louvres.

Below (bottom right) Frei Otto finds inspiration in cobwebs and other natural woven structures for his designs. A particularly good example can be seen in the roof structure of the Olympic Stadium in Munich (1968–1972, with Günter Behnisch) consisting of crosswise interlinked individual cables.



PHOTO BY WERNER HUTHMÄCHER



PHOTO BY JAKOB SCHOOF



PHOTO BY JAMIE TAITIVA

DAYLIGHTING

The natural gift of daylight
put to practice in architecture.

MEGALITH CIRCLE IN THE DESERT

Congress centre 'MAGMA', Tenerife

Text by Jacob Schoof.
Photos by Torben Eskerod.

Down at the southern fringe of Europe and right in the heart of Tenerife's tourism area on the south-eastern coast, Fernando Menis of Spanish practice AMP has created a congress centre of sheer archaic monumentality. Menis applied both patience and boundless creativity to foster an abundance of forms and textures that are largely unrivalled from only two external finishes – exposed concrete and fibre cement panels.





The southeast of Tenerife Island is a barren land – a semi-desert shielded by the volcano Teide (at 3718 metres the highest peak on Spanish territory), whose sparse vegetation rather betrays the close proximity to Northern Africa than to the distant mother country. If it was not for the booming tourism, one would have very little reason to suspect the existence of larger human agglomerations here – let alone one of the most important public buildings to be built on the island for the last decades. The 30 million Euro project MAGMA was originally planned as a pure congress centre, but during the planning phase the brief was extended to include theatre and concert facilities as well – finally a complete auditorium was added. In the future the building is to host regular concerts by the Orquesta Sinfonica de Tenerife, which so far mainly performs in the auditorium of the island's capital Santa Cruz that was designed by Santiago Calatrava and opened in 2003.

Last not least, due to its good traffic location MAGMA is expected to become a focal point for Southern Tenerife's economical and cultural development: the motorway

bound for Santa Cruz runs directly behind the building. The site was partially excavated out of the slope; facing towards the sea it forms a raised platform with a number of ramps running up to it.

At first glance, the congress centre situated above the town of Adeje curiously both draws on elements of international expressionism and a certain classic, tectonic heaviness, which the Spanish architecture of recent years has rediscovered. Fernando Martin Menis is well aware of this ambiguity of his design: He writes: 'From a distant point of view, the building presents itself as an arrogant construction in its forms, expressive and strong, while in short distance it dissolves in the territory, blending with the environment.'

Striving to label the unusual new building of Adeje with a common stylistic tag many critics have already likened it to Frank Gehry's architecture. Just like the Californian in his best buildings, Menis also plays with the tension of solid cubes and undulating roof elements. However, the congress centre lacks the vertical gesture of Gehry's buildings that reach to the sky; it stays close

Previous page Low, wide ramps lead from the town Adeje towards the forecourt of the congress centre located above. Behind the parapet the contours of the flat crouched building are perceptible to the right.

Left The two surface materials of MAGMA are fair-faced concrete and fibre cement shingles. The front sides of the concrete walls were treated with a jackhammer, in order to generate the appearance of weathered volcanic rock.

Top Overall elevation of the building complex as viewed from the slope above the town. From here, the alternation of bulky concrete cores and the wave-like fibre cement roofs gliding across becomes visible.



With mobile partition walls the upper conference level can be divided into a maximum of 26 small rooms. The space is mainly left open, then offering an unrestricted impression of the majestically curved roof, which towards the corners lowers down to the floor level.



Left View through the upper level. Lighting is provided by flush halogen spots in the ceiling and lighting slits in the roof, through which daylight enters the interior (always indirect).

Right The main staircase to the upper storey reveals Martin Menis' sculptural qualities. The façade of the rear office wing (in the photograph to the right) shows the patchwork from the smooth formwork pattern and the subsequently hammered concrete surfaces.

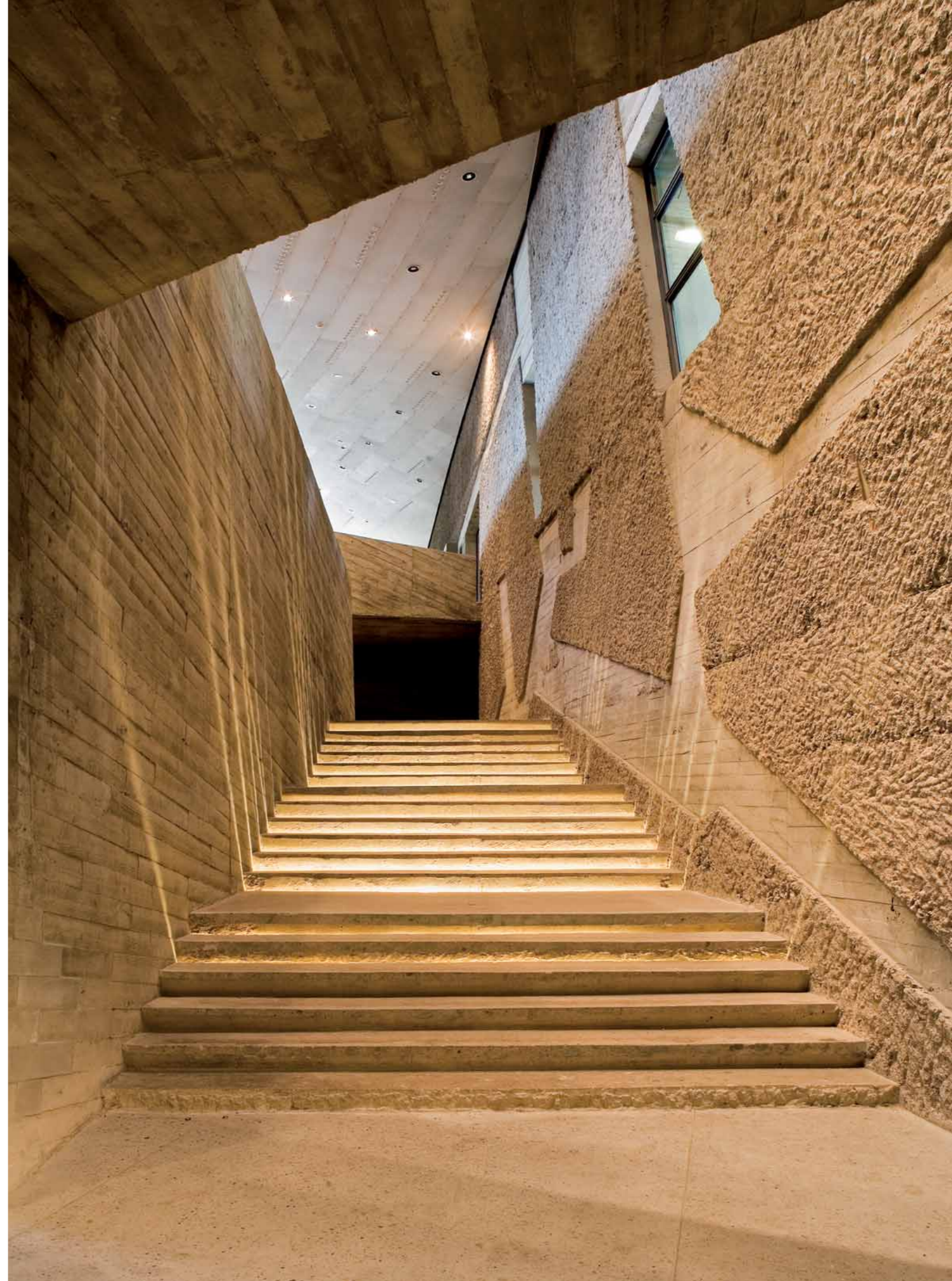
to the desert sand, thus pleasantly keeping a very down-to-earth profile. Menis compares the solid concrete cubes carrying the roofs to blocks of solidified magma; the undulating roofs themselves symbolise for him a liquid in movement that outlines the space in every direction.

As one approaches the building, the fragmented shape as a whole is broken down into individual building elements with an impressive presence and many contrasting textures. Accordingly, Fernando Menis had all concrete finishes treated in such way so they appear like rough blocks straight from the quarry: while the side façades received a diagonal formwork, which conjures up the image of a pattern left by a gigantic jigsaw, the far ends where subsequently roughened with jackhammers.

A massive steel lattice with suspended 45cm tall steel girders supporting the ceiling cladding below served Menis as roof structure. The irregular and double-curved roof surface was calculated and manufactured with the CATIA software. It was originally developed for aeroplane engineering and was successfully used on a string of biomor-

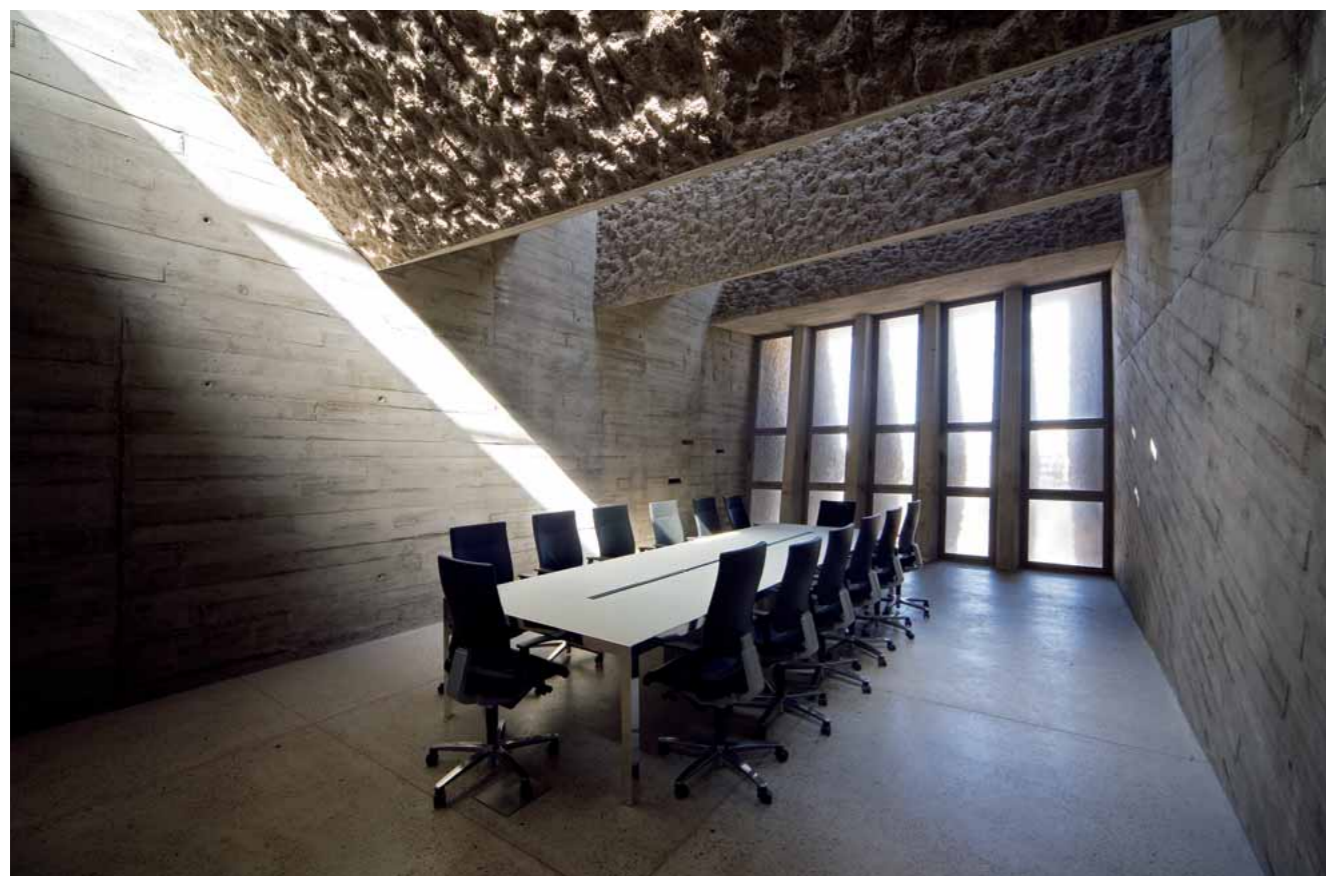
phic building structures during the last years. The undulating roofs are clad internally and externally with flexible fibre cement panels overlapping each other like scales. Even at the edges where the upper and under side of the roof meet Menis strictly avoided any edge profiles in order to sustain the rough, stony appearance of the building. Hence, the roof edges received a jigsaw pattern that harmonizes with the rough chiselled concrete finish. Interior mechanical services such as ventilation and electrical services, the soundproofing and guide rails for the acoustic partitions are concealed within the roof cavity.

A total of twelve concrete megaliths positioned in a nearly polar array subdivide the building plan, carry the roof loads and contain secondary spaces like WCs, escape stairs, offices and the press centre. The three building entries are located in between. They are equally low-rise and are shaded by sturdy balcony parapets and cantilevered roof segments. The main entrance leads from the forecourt to the foyer space and the adjacent public cafeteria to the left, which is to insure a minimum of public life



A massive, triangular balcony cantilevers from the upper floor into the auditorium. Just as natural rock formations, the formwork pattern on the walls hardly ever runs exactly horizontal or vertical; the diagonal is always dominant.





even on days without conferences. A second entrance leads from the rear of the building to the administrative wing; a third one is only used for large events and leads directly into the auditorium.

Visitors entering the building with the expectation of a common conference centre with industrial aesthetics, modular steel-glass walls and endless ceiling grids are bound to marvel at the resourcefulness of Fernando Menis' architecture: with sheer skill he gave the cave-like large spaces not only a special atmosphere, but also a flexibility that lives up to highest international standards. The 2350sqm multi-purpose hall on ground floor that houses a concert stage can also be subdivided into a maximum of nine smaller conference rooms. Also the upper floor can be used either as one 1865sqm conference hall or can be subdivided into a maximum of 26 smaller rooms. This astonishing flexibility of the programme is ensured by sound-insulated sliding walls, which are stored in back-of-house zones (Menis calls them 'wardrobe rocks').

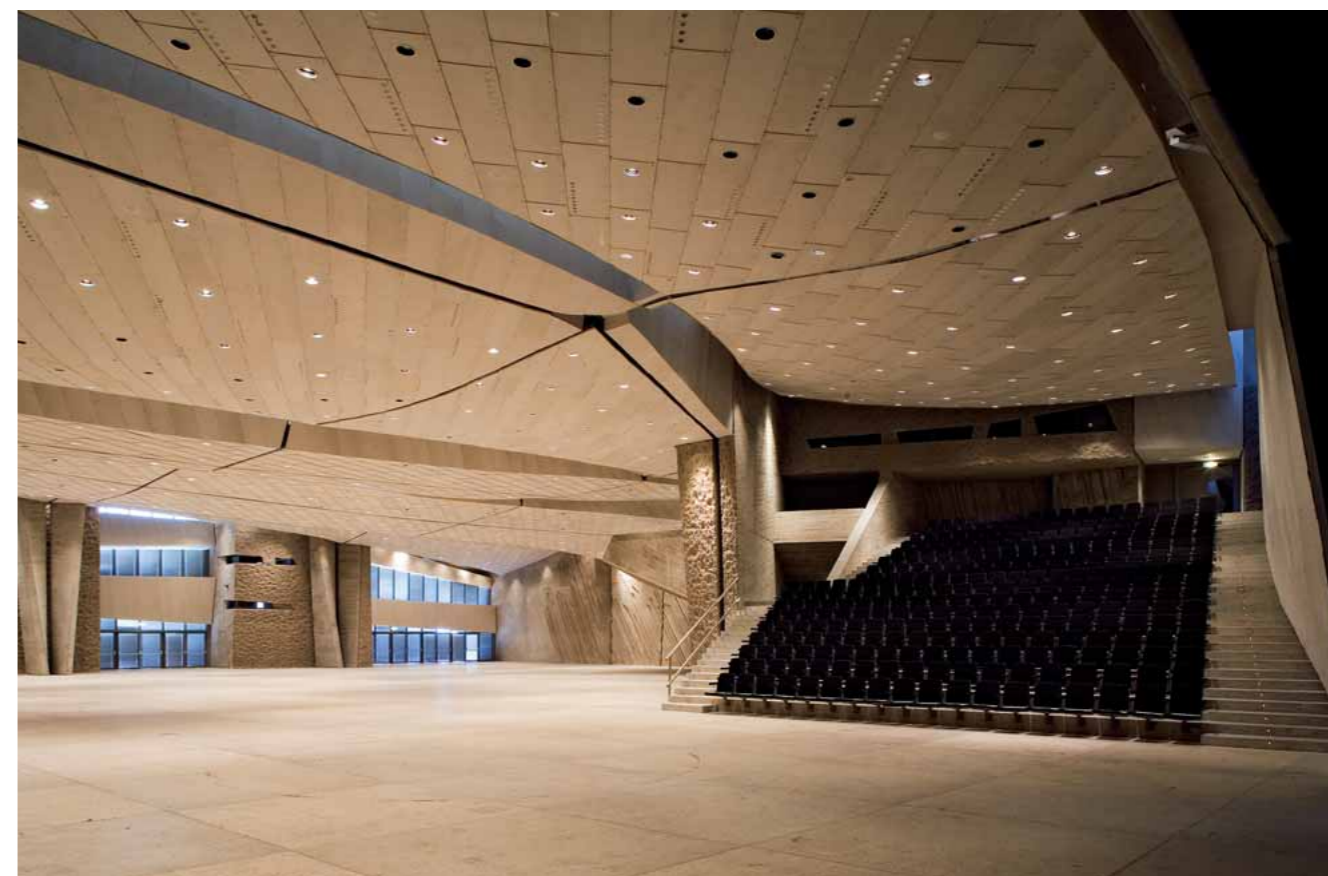
In the entrance hall epitomises all the archaic power of this building: it is low and

wide and relatively dark; huge hollow reinforced concrete girders span across the hall at such a low level that occasionally they almost appear to be within reach. The ventilation ducts have been integrated into the girders and the lighting system sits in the deep, dramatic recesses between them. Once again, Menis highlights here the concrete mass by showing the untreated formwork finish at the underside and by chiselling the sides. The adjacent main auditorium with its large ceiling span takes up the full height of the two to four storey building. Numerous recesses and alcoves not only make passing through the building a real sensual experience; they also enable many different uses at once: congress meeting and private conversation, lectures as well as informal social interaction.

Instead of simply fulfilling a programme and catering to every conceivable kind of use the building itself inspires a multitude of activities. The down-to-earth, stubborn architecture is at once functional and artistic: it is rational enough to enable all kinds of activities as well as being a sculptural work of art in its own right that does not depend solely on its use.

A conference room in a concrete bar. The narrow 'grietas de luz' (lighting slits) in the several meters thick ceilings and exterior walls generate some of the most impressive lighting atmospheres in the entire building.

Right The generous, two-storied auditorium is also divided by partition walls: dark gaps in walls and ceilings indicate these divisions. The ceilings were suspended by several meters from the roof's actual main load-bearing structure.



In the best sculptural tradition Fernando Menis makes masterly use of daylight. In southern Tenerife summer daytime highs of 40 degrees Celsius are common and generous direct day lighting of interiors is not advisable. Menis generally lights the spaces indirectly and makes restricted use of direct sunlight to highlight volumes or finishes. Narrow wall and roof light slots (grietas de luz) and circular openings – real 'light holes' (agujeros de luz) – are the most frequently used daylight openings in his design. In this respect, the press centre on the upper floor with its repletion of boxed hollow concrete girders and roof strip lights makes for a particular dramatic spatial impression. At night time, powerful halogen floodlights fitted into the ceiling gaps light the building.

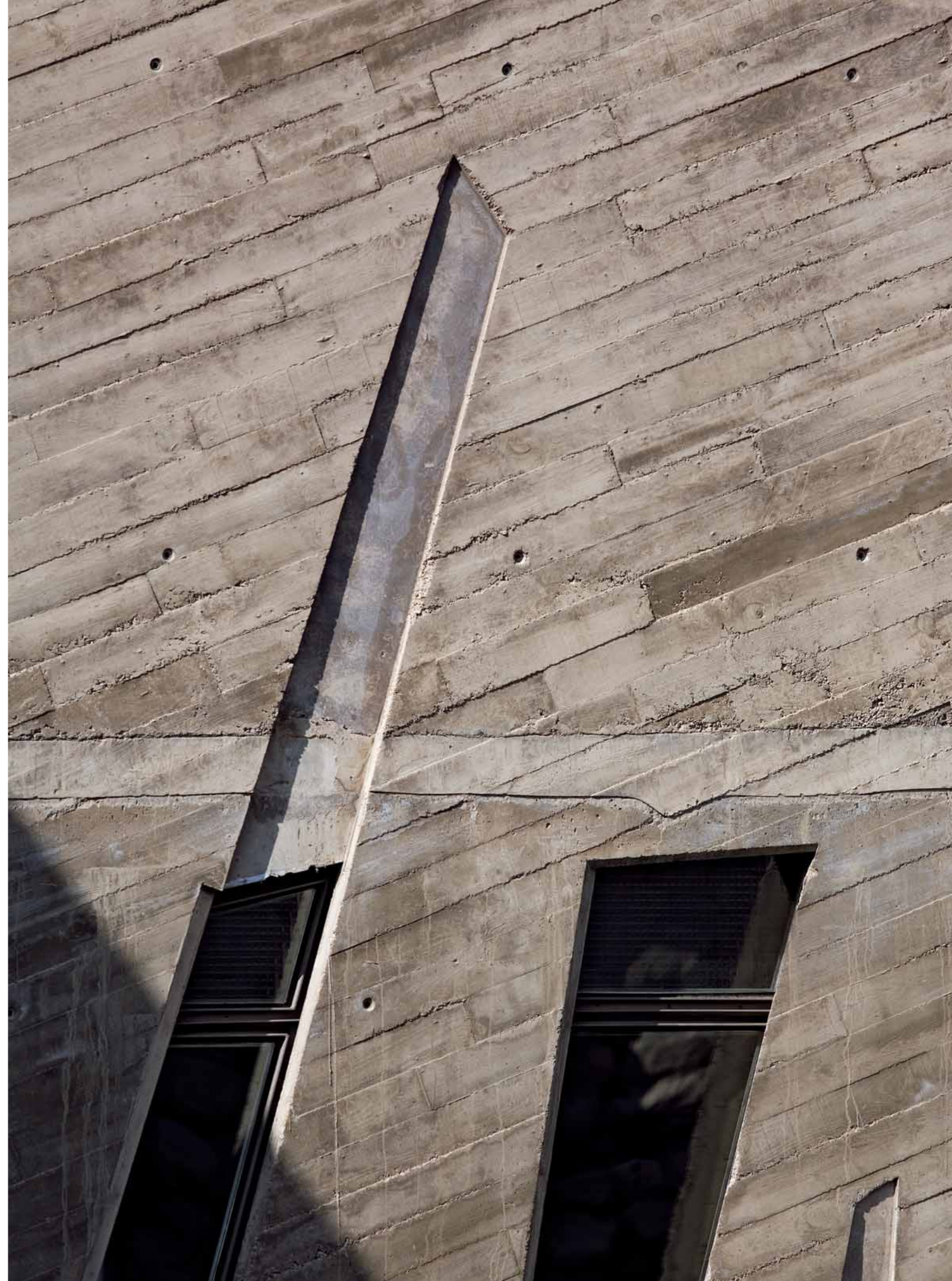
Both the final building and the design process followed a sculptural design intention: the first ideas for MAGMA were shaped in a plasticine model hardly bigger than a shoebox; this was followed by larger models out of plasticine and Styrofoam that were then directly translated into architectural drawings. Like the work of a sculptor, Menis' work flow followed a pattern of

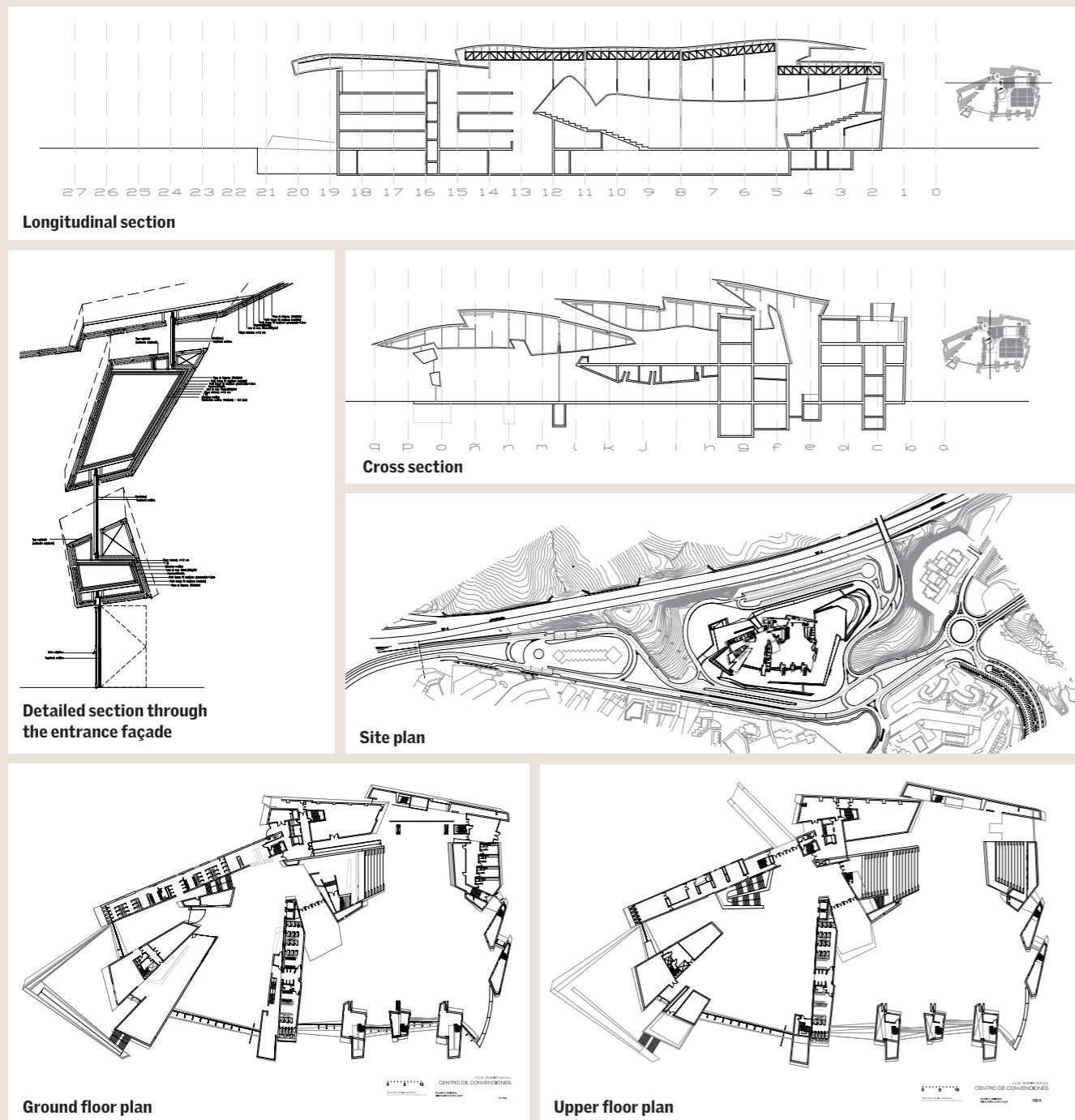
a trial and error: only a few details were pre-planned and many things were only drawn, redrawn and then changed again when the project was already on site. For such a geometrically complex building with such an abundance of details like MAGMA an extremely close involvement of the architect in the building process is probably an absolute must. In this particular case the building was only made possible by a totally loyal construction team that followed the many twists and turns of Menis' ideas nearly without condition.



Left The congress centre's colour and surface texture change in the course of the day. The roof overhangs are calculated in a way that they optimally protect the building from the strong midday sun.

Right Detail elevation of the concrete façade. The concrete was mixed with regional mineral powder, in order to adapt its colouring to the surrounding rock formations.





Facts

Building type	Congress centre containing auditorium, cafeteria and offices
Client	Canarias Congress Bureau Tenerife Sur S.A.
Architects	Artengo Menis Pastrana, Santa Cruz de Tenerife (Project architect: Fernando Martin Menis)
Location:	Costa Adeje, Tenerife
Date of completion	Autumn 2005



My home – which has had a decisive influence on my work – is the Canary Islands. Because of its particular geographical position with its large distance between Europe and America and the closeness to Africa, the archipelago forms an excellent cultural and economic connecting link between the three continents. The volcanic origin and the prevailing light conditions, colours and shapes account for the typical character of the islands which are surrounded by the Atlantic. These unique, natural conditions for their part influence the architecture, which does not submit to zeitgeist or short-term trends. When carrying out my projects – which try to capture at least a part of this uniqueness – I collect and analyse the materials which are characteristic for a building location. This approach has affected my architecture for many years. The design of a project partly on location has the doubtless advantage that examples can be produced on a 1:1 scale, allowing us to make changes in colour shades or discover unknown textures for certain materials. The site of the future building is thus also integrated into the project in this way. Because the materials used depend on the surroundings. Independent of the outline of the building, what the facade will look

like or how the building is to be divided up, I always choose the most suitable materials in my architecture, which are not only aesthetic, but also harmonize with the environment of the building. The appearance, the colour and the texture are the showpiece of a building. The art and congress centre MAGMA Arte & Congressos on Tenerife, for example, uses flowing lines to express itself, which start at the ground and continue over the walls to the wave-shaped roof, which sits enthroned above everything and gives the building a self-contained feeling. The dominating material is concrete, as this harmonises well with the hinterland and the desert-like landscape of the south of the island. In order to help match the concrete colour more to the landscape, brittle stone originating from local quarries, which is typical for this region, was added and is responsible for providing the ochre colour. The external texture of the building is a reminder of the eroding landscape of the south; it also gives the building vitality, depending upon the day-light. The light thus underlines the texture of the building from outside. In the interior, on the other hand, light is used in another way: It gushes in cascades over the floor and walls and gives rise to a diversified play between light and shade.

Fernando Menis



MAGMA
ARTE & CONGRESOS

NATURAL SURFACES

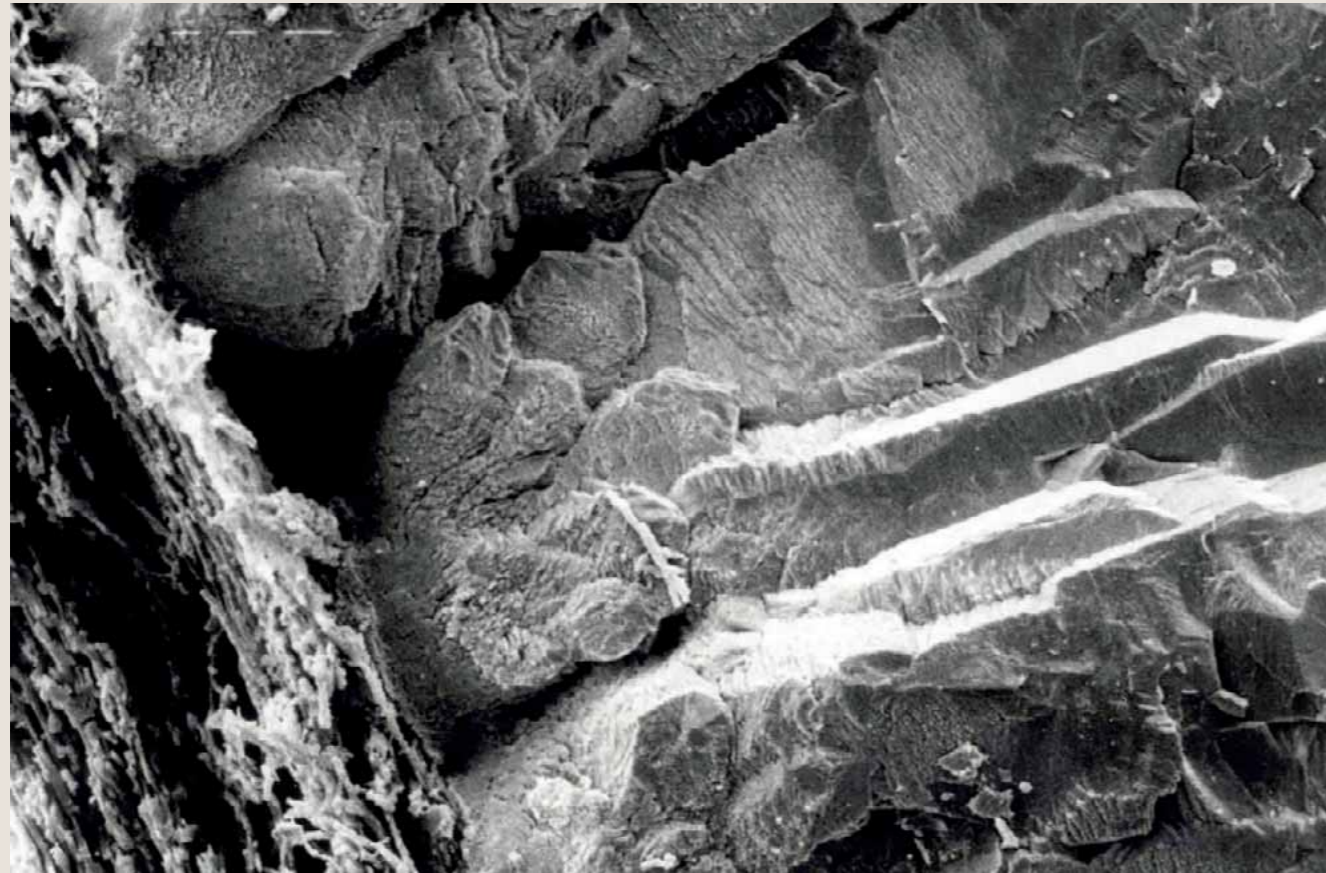


PHOTO (LEFT) AG HEYER/WMI BREMEN, OPPOSITE: PHOTOS 1, 3, 4 BY JACOB SCHOOF, PHOTO 2 BY DR. UDO KÜPPERS

Opposite Four examples of external natural surfaces:
 1. Gaudy scale-like plumage of a pheasant.
 2. Hydrophobic leaf surface of the lady's slipper.
 3. Multi-functional human skin.
 4. Translucent seed covering surface of the mother's heart.

Text by Udo Küppers.

Packaging bionics is concerned with the matter of technical inventions which can be derived from natural surface structures. This branch of science has already brought considerable progress to civil engineering in the past, for example, the self-cleaning 'lotus effect' for paints and rendering, metal and ceramic surfaces. However, the bionics of natural surfaces hides even more surprises for us, as Dr. Udo Küppers explains in his article.

SURFACES ARE INTERFACES and as such a universal characteristic of life. One could also say: Natural surfaces are the packaging of life. Even the smallest, thinnest piece of skin just a few millionths of a centimetre thick, a surface consisting of a double layer of fat molecules with its respective structure, provides an extremely effective way of conserving energy within the body. The surface of a layer of bark several decimetres thick of a giant sequoia tree protects its host directly and primarily against manifold weather influences, fires or animals. An unmanageable wealth of highly specialized surfaces spans between the smallest and largest interface of life, which evolution has been slowly improving step by step for millions of years. Inside a host there are special networks of cells (organs), for example, which differ from one another by surfaces which form borders, but still communicate with one another. It is the external covering surfaces against the environment, for example, of the human skin, which fulfil the numerous multifunctional protective functions. It is these external surfaces, in particular, which we perceive primarily as human beings. Across all spheres of life on earth, they serve to fulfil specialized tasks which are important for the survival of the host. Beauty and functionality are closely related in the case of natural surfaces. Evolution has understood how to combine both of these characteristics perfectly.

The exploration of the secrets of natural surfaces is incomplete without a glimpse into the microscopic depths of the layers. It is not until one looks on a micron and nanometre scale that the true success strategies of natural organisms and respective inorganic laminates become apparent.

Bionics is the catalyst between natural surfaces, which can serve as ideal examples of surfaces in engineering and architecture, and the functional, technical and architectural analogous product which is ready for use. It is an independent scientific discipline which can be easily differentiated from other disciplines through its analogy research:

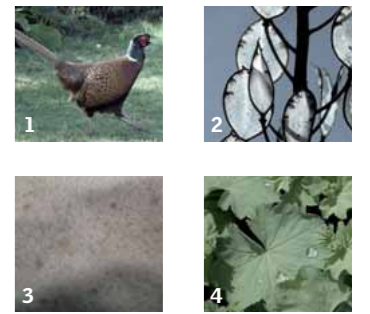
Bionics is concerned with the systematic technical implementation and application of the construction, processes and principles of biological systems.

Products, such as the dirt-repelling facade paints or a special film to reduce surface frictional resistance, are better known to a broad audience of interested persons by the terms 'lotus effect' and 'rib-let effect'. Detailed investigations on natural surfaces of the lotus leaf and the shark's skin led to these bionic, advanced technical solutions. These are just two of many exceptional results of bionic research and development, which not only make it clear to us just how superior nature's technology really is, but also show how easy it is to change a decade of old textbook knowledge on technical surfaces. Nature has known that all along: not only the smoothest but also the optimally structured surface is the cleanest.

PACKAGING BIONICS – MOTOR FOR THE DEVELOPMENT OF FORWARD-LOOKING TECHNICAL FUNCTIONAL SURFACES
 Natural packaging solutions satisfy a cross-section of tasks from protection and transport to storage and quality assurance of the 'packaged life' more easily than packaging solutions designed by human beings. If you look more closely at the natural surfaces of an organism, you will also soon discover their 'packaging secrets'.

Packaging bionics has in the meantime established itself as a self-contained growth area of the future within the scientific discipline bionics. It systematically analyses the elaborate variety of shapes, the clever structural combinations and the systemic transpiring energy, material and information processes of natural 'packaging' and, hence, natural surfaces as well (Küppers 2006, 2004, 2003, Küppers/Tributsch 2002).

The following examples of ten organism-related surfaces and surfaces covering organisms open up to us only a small window into the fantastic and highly efficient wonderland of natural surfaces:





PHOTOS BY DR. UDO WÖPFERS, EXCEPT NO. 3, GETTY IMAGES

1	Host	Polar bear
	Surface	Black skin with overlying fur of transparent light conducting hair
	Functions	Orientation, camouflage, heat conservation by total reflection
	Potential bionic solution	Transparent thermal insulation (building components already available in the market)
2	Host	Edelweiss
	Surface	White, furry coating
	Functions	Transparent, heat-insulating
	Potential bionic solution	Transparent heat insulation
3	Host	Ostrich chicks
	Surface	Eggshell surrounding the host
	Functions	IR light reflection, breathes, resistant to bacteria, optimum shape
	Potential bionic solution	Dimensionally stable, free-standing and break-proof spatial covering with integrated supply lines
4	Host	Macadamia
	Surface	Shell covering the host made of cellulose, brown speckled, spherical surface
	Functions	Extremely break-proof, presumably due to special shaped cell networks, optimum surface-volume ratio
	Potential bionic solution	Anti-vibration building support members, break-proof roof constructions
5	Host	Hazelnut
	Surface	Shell covering the host made of cellulose, green, later brown coloration, wavelike, cylindrical-spherical surface
	Functions	Highly break-proof, integrated nutritional transport capillary tubes, perfect alignment of the cell networks to protect the growing nut
	Potential bionic solution	Dimensionally stable, free-standing and break-proof spatial covering, breakproof roof constructions

6	Host	Giant sequoia
	Surface	Brown coloured, fibrous, soft and aerated bark
	Functions	Very light, strongly tannin-containing and hence bacteria resistant, highly heat insulating, fireproof
	Potential bionic solution	New environmentally friendly material composition as insulation material for the building sector, flame repellent, fire retardant laminate layers, bacteriainhibiting protective film
7	Host	Geranium plant
	Surface	Wax covering
	Functions	Translucent, avoidance of evaporation, abrasion-proof
	Potential bionic solution	Ultra-light, transparent protective coverings, e.g. for solar cells, facade elements, etc.
8	Host	Edible onion
	Surface	Multi-layer laminate film
	Functions	Optimum surface-volume ratio, temperature regulator, highly resistant to moulds, transparent, thermally insulating, resistant to bacteria
	Potential bionic solution	Ultra-thin, temperature-balancing laminate layers for active regulation of room climate, application for stationary and mobile room coverings
9	Host	Blue butterflies (Lycaenidae)
	Surface	Linear oriented micro-/nanostructure, blue lustre
	Functions	Colour production without using a colorant
	Potential bionic solution	Coloration of any kind by physical effects without any additional colorants
10	Host	Knotweed plant
	Surface	Green
	Functions	Special space-saving convolutions, stability of large areas with single-point attachment
	Potential bionic solution:	Packing larger areas into small volumes, flexible, light-collecting and at the same time shade-giving functional protective covering

THE OSTRICH EGG – FUNCTIONAL SURFACE WITH PROTECTION FOR DEVELOPING LIFE

Eggs are one of nature's many ingenious forms of packaging, in which life can develop protected from external disturbances. This life has to be supplied through the mineral shell with life-giving oxygen from outside. Expired carbon dioxide has to be able to escape from inside to the outside. Environmental influences, such as strong UV sunlight, have to be reflected from the shell surface. Furthermore, the developing ostrich has to avoid the penetration of micro-organisms through the shell structure. Finally, the shell has to be able to withstand mechanical impact, in other words, possess a certain degree of breaking strength. These characteristics make the shell of the ostrich egg a perfectly adapted packaging in the boiling hot habitat of the African deserts.

South African San (bush-men) have been living for thousands of years in close proximity with nature, which they use for their survival purposes without destroying it. The empty ostrich egg integument is therefore an excellent liquid depot for them. Brackish water, a mixture of fresh and salt water, is filled into the eggshells by the hunters, which are closed with clay plugs and given a tribal mark and buried. After returning from week-long hunting expeditions in the desert, the water is still drinkable.

The reason for this is to be found in the special structure of the eggshell: An inorganic calcium shell structure with a columnar cross-section followed by an inner membrane of tissue (protein network). The shell is rounded off to the outside world with a smooth calcified outer layer. An organic outer skin like a tomato, for example, does not exist for the ostrich egg. As this anti-bacterial outer skin is missing, the pores of the shell function as a bacterial barrier: They possess openings with a diameter in the sub-micron range, which makes them permeable to air but not to bacteria (size 1–2 microns).

Packaging bionics utilises the properties of the breathing ability and bacterial resistance of this biological packaging. A water-repellent, actively breathing membrane coated with ceramic material was manufactured according to the same principle as the ostrich egg. The bionic packaging films used presently consist generally of normal plastic, such as pet, which are given pores in the sub-micron (pore diameter 500



PHOTO BY AG HEYER, UNIVERSITY OF BREMEN

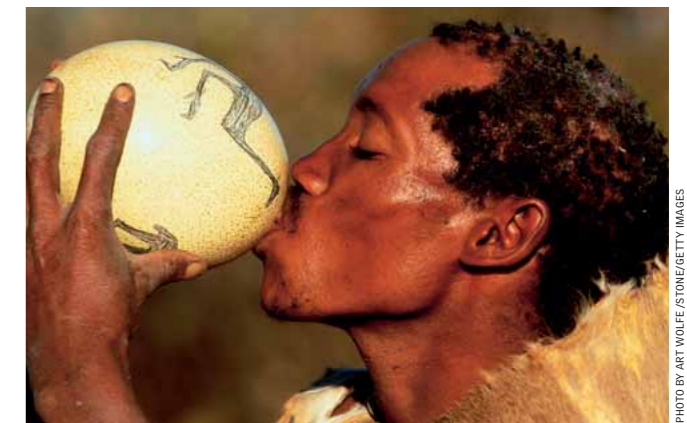


PHOTO BY ART WOLFE / ISTOCK/GETTY IMAGES

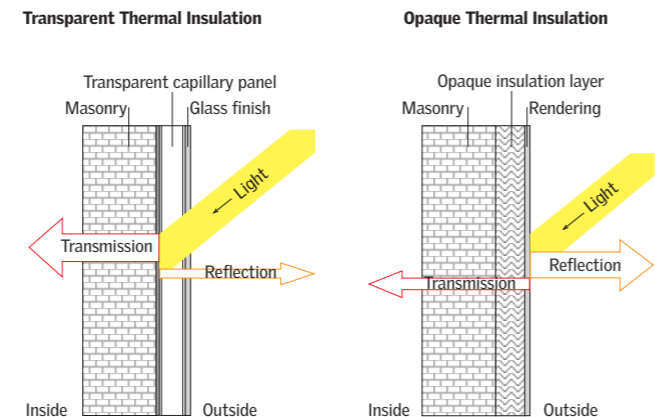
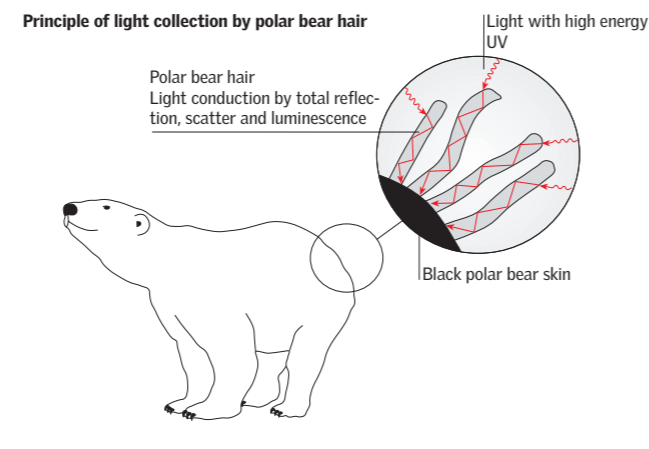
Above (from the top)
Shell of an ostrich egg. The small inlet and outlet points for gas exchange can just be recognized with the naked eye on the porcelain-like surface (links).

A San from the Kalahari with ostrich eggs used as water storage containers for hunting.

Below (top left) Stability testing of foodstuffs. PVC film (17), Bionic film (18).

Below (top right) The section through a hazelnut at high magnification under the scanning electron microscope.

Below Polar bear hair conducts the high energy UV-light by total reflection, scatter and luminescence to the black body surface of the bear, where it is converted into heat (middle). Transparent Thermal Insulation works according to a very similar principle in civil engineering (bottom).



ILLUSTRATIONS BY DR. UDO KÜPPERS

nm) to micron range using a special radiation process. The film then receives its anti-bacterial and self-cleaning effect by means of a surface treatment with non-toxic nano-particles. These nano-particles sit tightly both on the surface as well as on the walls of the pores, so that an additional anti-bacterial 'in-depth effect' is achieved. In a first comparative test in practice using standard packaging films made of PVC, the membrane showed clear advantages for use with foodstuffs to prevent fungal attack.

Other examples of further uses for this bionically developed and structured surface are to be found in filter technology and civil engineering. The fact that this particular surface structure can be applied both to flexible as well as firm technical surfaces offers a number of starting points for the architect, for example, to prevent mould formation and decay in poorly ventilated rooms. It is imaginable to use wall elements made of thin laminate, which are stiff and provide support and possess the corresponding effects of the bionic films described above.

THE HAZELNUT SHELL – BREAK-PROOF COVERING WITH INTEGRATED SUPPLY LINES

The hazelnut is distinguished by a velvety smooth outer surface, which is reflected in its particular surface structure. As this is the actual outer wall of the fruit, the outermost layer is the regular epidermis from which short hairs can grow.

The astounding results of measurements from breaking load testing show that the shell can withstand point loads of up to approx. 700 N. This is, hence, in the lower middle of the range between a peanut shell (100 N) and a macadamia shell (3000 N) and far lower than that of a coconut shell (10000 N). By looking through the visible shell surface into the micro- to nanometre range material structures, this provides a first concrete explanation into the secrets of the material's strength, elongation and other quality characteristics. The macroscopic and microscopic cross-sectional view of the hazelnut shell clearly shows the different cell shapes and the integrated transport channels for the supply of nutrients. These inner transport channels are recognizable with the naked eye as peripheral reinforcing lines. The cell networks have perfectly matched breaking strength and an integrated tubing system, making the hazelnut shell an interesting bionic object

for technical engineering and functional assembly parts. The first models for rigid, thin wall elements with integrated supply lines are being prepared.

THE POLAR BEAR'S COAT: LIGHT COLLECTOR AND HEAT DONATOR

Polar bears live in the far North of our earth, the Arctic. The coat of the polar bear is white and hence adapts perfectly to the surroundings. Colour is, however, not only an evolutionary adaptation feature. As researchers were photographing and counting the warm-blooded polar bears with infrared (IR) cameras (infrared sensitive films detect heat particularly well), they experienced a surprise. The developed films did not show a single polar bear, although the researchers had seen them with their own eyes. Ultraviolet (uv) sensitive films (uv light possesses higher energy and shorter wavelength radiation than IR light) showed after development the polar bears as black dots in the white Arctic Sea. The coat of the polar bear, which is covered with small tubular hairs, collects the high energy ultraviolet Arctic light, conducts it with the aid of different physical mechanisms through the tube-shaped hairs to the body surface and converts it there into heat. Little of this heat is lost to the outside. For this reason, it was not possible for the camera people to sight the polar bears to start with by thermal radiation. Experiments, in which the author was also involved, confirm this biological mechanism of efficient protection against heat loss.

A similar principle for the conversion of light into heat is known in the architectural world as Transparent Thermal Insulation (TWD). Building assembly parts which use this principle consist of a thermally absorbing, black absorption layer with a transparent capillary panel (capillaries are small tubes like those of the polar bear hairs) and an external, translucent weather-proof protective layer. Compared to an opaque, in other words non-transparent, insulation layer of the same thickness on the same masonry, Transparent Thermal Insulation can conduct considerably more heat to the inside of the house through the stonework. It is therefore a very effective, energy-saving application from the field of building bionics, which has been used successfully for many years especially in one-family and multiple family dwellings.

References

- Küppers, U. (2006)** Grenzflächen des Lebens – Die Natur als Verpackungskünstlerin (Interfaces of life – nature as a packaging artist) in: Faszination Bionik – Die Intelligenz der Schöpfung, Editor: Blüchel/Malik.
- Küppers, U. (2004)** Architekten der Natur – Organismen als geniale Baumeister und ingenieure (Architects of nature – Organisms as ingenious builders and engineers) in: Mensch + Architektur, Nr. 46/47, September 2004.
- Küppers, U. (2003)** Grenzflächen des Lebens – bionische Nutzen für die Verpackungstechnik? (Interfaces of life – bionic uses for packaging engineering?) in: Baier et. al (Editor) Transparenz und Leichtigkeit, Symp., University of Essen.
- Küppers, U. and Tributsch, H. (2002)** Bionik der Verpackung - Verpacktes Leben verpackte Technik, (Bionics of packaging – packaged life, packaged technology) Wiley VCH, Weinheim, approx. 300 pp.

Dr.-Ing. Udo Küppers studied production engineering/machine tools and wrote a doctorate at the TU Berlin with an experimental thesis on aerodynamic, evolutionary strategic wing optimisation. Dr. Udo Küppers has been active in the field of applied bionic research and development. His core competencies lie in packaging, organisational and evolutionary bionics as well as bionic dynamics. Udo Küppers has held numerous teaching positions in bionics at technical colleges and universities and is the author of numerous expert publications as well as several books and patents.



54° 18' 12" N, 0° 24' 36" W
1981

REACHING FOR THE SKY
TWO PASSING SEA GIANTS
SMILE FOR MY CAMERA



Photo and haiku by Michael Kenna
Wave, Scarborough, Yorkshire, England. 1981
www.michaelkenna.net

LIGHT AND MATERIALS



PHOTO BY VACLAV SEDIV / OUSA A. PALLADINO

Above Carlo Scarpa: Museo del Castelvecchio, Verona (1961–64) Light creates contrasts: the rooms in the museum are plastered with rough “Stucco alla veneziana”. Scarpa uses it to diffuse the light evenly and without reflections and to provide a contrast to the smooth, dark pedestals of the exhibits.

Text by Marietta Millet.

Light and materials are inseparably connected, indeed they actually determine each other: neither is visible to the human eye until the two come together. For this reason, great architects have always also allowed themselves to be directed by the light in the choice of their building materials. They use light to draw out contrasts between different materials and they use materials that allow them to create a very specific distribution of light in a room.

LIGHT AND MATERIALS are mutually dependent on each other. Materials are key to understanding light in architecture because they directly affect the quantity and the quality of the light. Two qualities of materials – their finish and their color – are most important in this regard. Specular materials, such as glossy finishes, reflect light as a mirror does, which can result in reflected images of the light source being visible ‘on’ the surface. Matte surfaces, such as natural stone, wood, and plaster, reflect light diffusely equally in all directions. Of the three aspects of color – hue, value, and intensity – value is the one that determines how much light is absorbed and how much is reflected. A white wall reflects approximately 82 percent of incident light, a light yellow wall 78 percent, and a dark green or blue wall 7 percent.¹ Colored surfaces lend some of their hue to light that is reflected.

A change in materials can alter the feeling of a room and the level of illumination as well. The cheapest way to increase the amount of light in a dark room is to paint the room surfaces white. A dark room, on the other hand, can be created either by using little light in a white room or through dark surfaces. With dark surfaces, a room will look dark during both daytime and at night. With light or white surfaces, however, the effect changes depending upon the light sources used. This effect can be exploited. For example, the interior surfaces of the chapel of Notre Dame du Haut at Ronchamp are white, but due to the small quantity of daylight admitted, perceptually the surfaces grade from light gray to dark gray.

Materials are important emotionally in relation to light. The sparkle of glass, the glitter of gold mosaics, the depths of dark polished wood, and the shadows on white walls all hold emotional messages, some of them connected with cultural settings, some of them connected to individual recollection. Some regions have building traditions and materials that respond to particular local conditions, such as the stucco alla veneziana favored by Carlo Scarpa. Requiring a labor-intensive process of application with very particular materials, the stucco ‘over time takes on a softer, more moist look, a quality of fantasy and beauty.’²

LIGHT EMPHASIZING MATERIALS

Emphasis on materials is grounded in the interaction between light and material. Highlights arise from glossy materials

reflecting discrete points of light. Definition of surface texture comes from grazing light. Revelation of the inner qualities of materials results from light passing through them. Dark shadows result from light being deflected from the surface, and from material absorbing light.

Light emphasizes the materials in Patkau Architects’ Newton Library at Surrey, at the same time as the materials emphasize light and foster its distribution. As the architects have stated, ‘because the light of the Vancouver area can be very soft, even weak, under the frequently overcast skies of winter, the robust light-absorbing character of heavy timber and concrete, in themselves, are not appropriate to distribute natural light into a relatively deep floor plate.’ The ceiling surfaces of the library have therefore been treated where needed with material that distributes light to the interior. Near the tall sloped north glazing, where the large area of glass provides abundant light for reading, the ceiling surface is the exposed underside of the wood decking. In such a situation, care must be taken so that the contrast between materials at the perimeter glazing and the sky is not too great, causing discomfort. Here the wash of daylight over the wood beams and onto the underside of the ceiling helps to mitigate the contrast at the edge as well as even out the brightness of the ceiling from the window wall to the center of the room. About midway between the glazing and the low center beam, sheet rock surfaces painted white were applied as the ceiling surface, better reflecting the daylight down to the area below. Each material is used honestly to do what is needed and no more, forming an economical building shell. The layering of materials discloses the role that each plays in the total realized construction.

Usually the glazing material is not the object of attention in a room. Special glazing materials, however, such as thin slabs of stone, can be emphasized by the way they transmit light. Under the barrel vault of the trustee’s board room, overlooking the library at the Museum of Contemporary Art (Arata Isozaki, 1981–1986) in Los Angeles, California, onyx has been used to glaze a semicircular opening and four windows below it. The onyx fits tight to the ceiling, so that the glow of the entering daylight is carried along the black concrete ceiling surface. Attention is called to the onyx as it is the brightest surface in the room. The thickness of the material saves the window from

being a source of glare. Light reveals and celebrates the onyx, making it the identifying feature of the room.

In the central six-story light well in the Casa Batllo (Antonio Gaudi, 1904–06) in Barcelona, Spain, Gaudi designed the ceramic tiles that cover its surfaces to manipulate light. By modulating the hue, value, and texture of the tiles, he modified the qualities and quantities of light experienced in the light well itself as well as in the adjacent apartments. The tiles range in color from a deep blue through lighter shades of blue to an off-white. The deep blue tiles are placed in their largest concentration at the top of the light well, on the surfaces directly under the skylight glazing, interspersed with lighter tiles. The effect here is cooling, almost as if one were seeing the light underwater. At the bottom of the light well are placed the lightest tiles, interspersed with a few darker ones. In between, the colors gradually shift from dark to light. This distribution of the colored tiles evens out the perceived light gradient in the light well, establishing a balanced light. Thicker patterned tiles, which reflect the light from their corners, are scattered among the smooth ones along the entire height, adding a glint of sparkle. In addition to the use of materials to manipulate the light, the shape of the light well – wider at the top – and the sizing of the windows – larger at the bottom – serve to balance access to light for all residents. An additional geometric manipulation of the section of the light well is the insertion of balconies, with glass panels serving as flooring for the balcony and as a skylight for the room below. The light that enters the apartments through the windows in the light well is therefore more equal than in the usual situation where the rooms at the top garner all the light and the rooms at the bottom are in shadow. Ventilation apertures are separate from the glazed windows, thereby adding more light to the interior when they are open. In the Casa Batllo, light was used in a thoughtful way with consideration for the well-being of the inhabitants, their need for light and air, and artful ways to provide them. Light was apparently considered at each step in the design process: concept, development of plan and section, window size and placement, surface shape and composition, and details. The tile work is not only beautiful, but also serves the purpose of modifying the daylight as it enters the building and is distributed to the apart-

ments. Control and delight are both provided. The materials of electric lighting fixtures are as important as those of building surfaces which are acting as daylighting fixtures. In the Resurrection Chapel (Erik Bryggmann, 1939–41, renovated 1984) in the Turku Cemetery in Finland, the brass lighting fixtures reflect daylight with a cool yellow that warms to an amber glow when the incandescent lamps are turned on. The material and details of the fixture respond to the incandescent light. The vertical blades that baffle views of the lamp glow with the light reflected between them. The ‘crown’ of brass loops circling the top catch the light, as do similar ‘crowns’ higher up. The pools of gold light in the cool interior lend a warmth and points of attraction similar to the glow of a fire. The light furnished by electric lighting fixtures is contrasted with the daylight in both color and distribution. While the daylight washes the surfaces of the interior with fairly even light, the electric lighting fixtures act as points of focus.

In Henry’s Church (Pitkänen, Laiho and Raunio, 1980) in Turku, Finland, the material of the lighting fixtures appears entirely different under daylight and under electric light. With daylight streaming in from large windows, the white screen material is almost transparent, and the brick wall shows clearly through it. When illuminated from below, the white material becomes a reflector, casting the light back down to the congregation. As it does so, it obscures the view of the wall directly behind it and casts a warm glow over the nearby wall surface. The material switches between revealing what is behind it and reflecting what is in front of it, as does a scrim curtain in theater productions. Through it, one becomes more aware of the difference between the nature of daylight and electric light.

LIGHT MUTING MATERIALS

Materials can also be chosen to mute the effects of light, to make dissimilar materials appear similar, or to make the light seem unchanging. The shoji screens in traditional Japanese houses diffuse all the daylight that enters, whether the skies outside are sunny or overcast. The light is first shaded by the large overhanging roofs acting as a parasol, so that the interior muted effect is constant. The interior surfaces are carefully crafted to interact with the light. Junichiro Tanizaki explores this connection between light, materials and cul-

1. Patkau Architects: Newton Library, Surrey (1990)

Material directs light: Patkau Architects carefully chose white ceilings and walls made of plaster board in their library, to guide the often weak and diffused daylight of British Columbia deep into the interior of their reading rooms.

2. Arata Isozaki: Museum of Contemporary Art, Los Angeles (1981–86)

Light refines material: Arata Isozaki had panes of onyx fitted in the arched windows of his museum building instead of glass. The material that is rather dull looking from the outside shines beautifully with the light behind it and reveals the full beauty of its exquisite grain.

3. Antoni Gaudí: Casa Batllo, Barcelona (1904)

Material divides rooms into zones: the tiled cladding of this inner courtyard becomes gradually paler from the top to the bottom. In this way, Gaudí compensated for the successive reduction in the level of daylight towards the bottom.

4. Erik Bryggman: Resurrection Chapel, Turku (1939–41)

Material changes light moods: during the day, the brass lights in the nave of the chapel reflect the daylight in a dull shade of yellow. Evenings and night, they themselves fill the church with a warmer, golden-yellow light.

5. Pitkänen, Leiho and Raunio: Lights in St. Henry’s Church, Turku (1980)

Light changes materials: during the day, the glass reflector is almost transparent and provides a free view of the brick wall behind it. At night, it shines in the glow of the light source mounted below it as a yellow, opaque panel.

6. Interior of a Japanese house

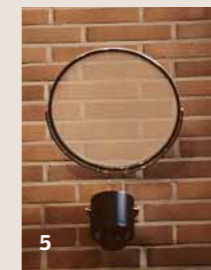
Material evens out the differences in light: characteristic of traditional Japanese houses are their far overhanging roofs and translucent ‘shoji’ walls, which keep the level of light in the rooms inside at a constantly low level during the entire day.

7. Dale Chihuly: Nijima Floats (1992)

Material transforms light: in this installation at the Seattle Art Museum, it was less the glass balls themselves that were at the fore than the continuously changing light reflections they threw on the surfaces of the room.

8. Willard T. Sears: Isabella Stewart Gardner Museum, Boston (1899–1901)

Light creates an affinity with a place: the Loggia in the inner courtyard is a detailed reference to Venetian models, and even the plaster was mixed to a Venetian recipe. However, the result is only convincing to the human eye when the daylight has that same typical silvery-soft atmosphere as in Venice.



Below Le Corbusier: Notre Dame du Haut, Ronchamp (1950)
Light changes colour impressions: here, the irregularly positioned windows reveal the extreme thickness of the walls in the church building. The surfaces of the walls, which are actually covered in white plaster, have a different appearance in the back-lighting; they seem to be more pale grey to dark grey.

Opposite Louis Kahn: Kimbell Art Museum, Fort Worth (1966–72)
Light modulates material contrasts: the surfaces of the walls in the museum are made of travertine, the arch of exposed concrete. According to the direction (direct or indirect) and nature of the light (daylight or artificial light), either the contrasts between the materials are emphasised or the materials appear to blend into each other.



PHOTO BY ACHIM BEDNORZ/BILDARCHIV MONHEIM



PHOTO BY ROBERTO SCHIENZI/NESTO

ture in his book 'In Praise of Shadows', in which he explains the traditional preference of Japanese people for shadows and soft, broken light:

"We do our walls in neutral colors so that the sad, fragile, dying rays can sink into absolute repose. The storehouse, kitchen, hallways, and such may have a glossy finish, but the walls of the sitting room will almost always be of clay textured with fine sand. A luster here would destroy the soft fragile beauty of the feeble light. We delight in the mere sight of the delicate glow of fading rays clinging to the surface of a dusky wall, there to live out what little life remains to them."³

The 'lume materiale' (literally: 'material light') of Venice⁴ seems to glow in Boston, Massachusetts, at the Isabella Stewart Gardner Museum (Willard T. Sears, 1899–1901). The wall was prepared in a similar way to the traditional Venetian stucco, and consists of plaster impregnated with color introduced by using a wash of pink paint. The light of Boston is not the light of Venice, but the appearance can fool the eye on certain days. The surfaces seem to glow in and of themselves so that the light is more real than the material. Likewise, in the exhibition of glass balls, Nijima Floats, by Dale Chihuly (1992 at the Seattle Art Museum), the light that is cast by the glass seems to be the point of the piece. It is not the balls themselves that are so important, but the patterns of light that they cast on the surface below. The material (of the balls) transforms the light which then transforms material (the resting surface).

Louis Kahn was very aware of the nature of a material's response to light. Kahn's selection of concrete and travertine as materials for the Kimbell Art Museum (1966–1972) in Fort Worth, Texas, was related to how their surface characteristics shaped that response:

"Travertine and concrete belong beautifully together because concrete must be taken for whatever irregularities in the pouring are revealed. [...] Time, he believed, would unify all materials eventually, but the architect could achieve unity by carefully choosing certain materials—wood, travertine, concrete — 'which are so subtle that each material never ruins the other [...] And that's why the choice.'⁵

The travertine, unfilled and unpolished, has certain characteristic ways of reacting with light that complements the

reaction of concrete to light. As the light changes — outside and inside — the surfaces of the two materials shift subtly in relationship to each other. First one seems warmer, then the other does. First one appears to be lighter, then the other. One seems to have a glossy surface, and the other a matte finish, and then they switch. One looks more mottled, then the other one does. The surfaces respond to the changing light. Light is the real material here.

'I think light is as material as anything else.' — James Turrell⁶

Marietta Millet is Professor Emerita in the Department of Architecture at the University of Washington, where she has taught undergraduate and graduate design studios, lighting and color seminars, daylighting and electric lighting, climate responsive design and building performance. She was a partner in Loveland/Millet Lighting Consultants and is the author of the book *Light Revealing Architecture*, published in 1996 by Van Nostrand Reinhold.

This text was reprinted from the book *'Light Revealing Architecture'* by Marietta Millet, © 1996, with kind permission of John Wiley & Sons, Inc.

¹ Reflectance can be calculated by measuring the incident illumination in foot-candles (1 foot-candle = 1 lumen per square foot) on a surface and then, under the same lighting conditions, measuring the luminance in foot-lamberts (1 foot-lambert = about 3.426 candela per square meter) of the surface. Reflectance is luminance divided by incident illumination.

² Zambonini, Giuseppe: 'Notes for a Theory of Making in a Time of Necessity', in: *Perspecta* 24, p.3–23. Recollections of Eugejio de Luigi, a long-time collaborator with Carlo Scarpa

³ Tanizaki, Junichiro: 'In Praise of Shadows', Newhaven 1977, p. 18.

⁴ See also: Marco Frascari: 'The Lume Materiale in the Architecture of Venice', in: *Perspecta* No. 24, 1988

⁵ Interview with Louis Kahn, by Marshall Meyers in 1972. Reported in Loud, Patricia Cummings: 'The Art Museums of Louis I. Kahn', Duke University Press, Durham 1989

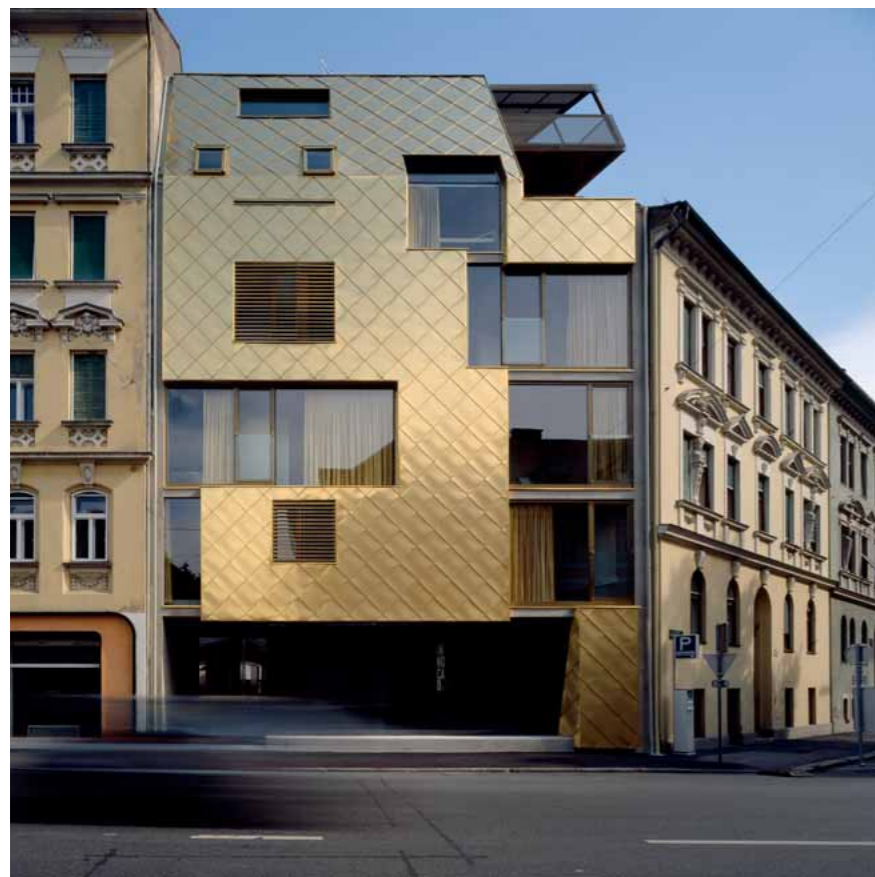
⁶ Millin, Laura (ed.): 'James Turrell: Four Light Installations', The Real Comet Press, Seattle 1982, p.18

A DRESS FOR SPECIAL OCCASIONS

Text by Katja Pfeiffer.
Photographs by Paul Ott.

Golden gleams the façade of the 'Golden Nugget' in Graz, entirely complying with the philosophy of the young architects from Innocad. Their office, designed by the four architects themselves, embodies corporate identity and is simultaneously a residential block that glamorously presents itself in its neighbouring urban fabric characterized by the Wilhelminian style.





Left Hardly perceptible: The floor-to-ceiling, almost profile-free glass skin and the black curtain consisting of fine threads, which visually separates the Innocad practice from the passers-by.

Opposite The courtyard façade also presents itself in a gold-coloured texture. The almost transparent metal stair railing seems to be moistened by a delicate hint of gold powder or blossom pollens.

The Line: One unit towards the top, then to the left, further upwards, until the level on which it is positioned leaves its dimension towards the sky above Graz. The façade envelope now becomes the roof, evenly covered with a net from gold-coloured copper. **The Seven Squares:** They seem to change their location like pieces in a framed puzzle; the golden curtains however follow their own directive. The puzzle master does not care, he continues the moving around and places the three open squares one above the other. **A Golden Termination** huddles against the eaves of the neighbouring house. The light steel balcony recesses from the façade level.

The 'Golden Nugget' located on the edge of Graz' historic district places an accentuation, resembling a gleaming evening dress in the last rays of the sun. The external texture is a laminar net from shinning gold-coloured copper tiles. It connects the neighbouring Wilhelminian style buildings painted in yellow hues, closing the street front as a homogeneous entity. The staggering of the new building contour also mediates between the adjoining houses of various heights. Invisible from the outside remains the courtyard building dat-

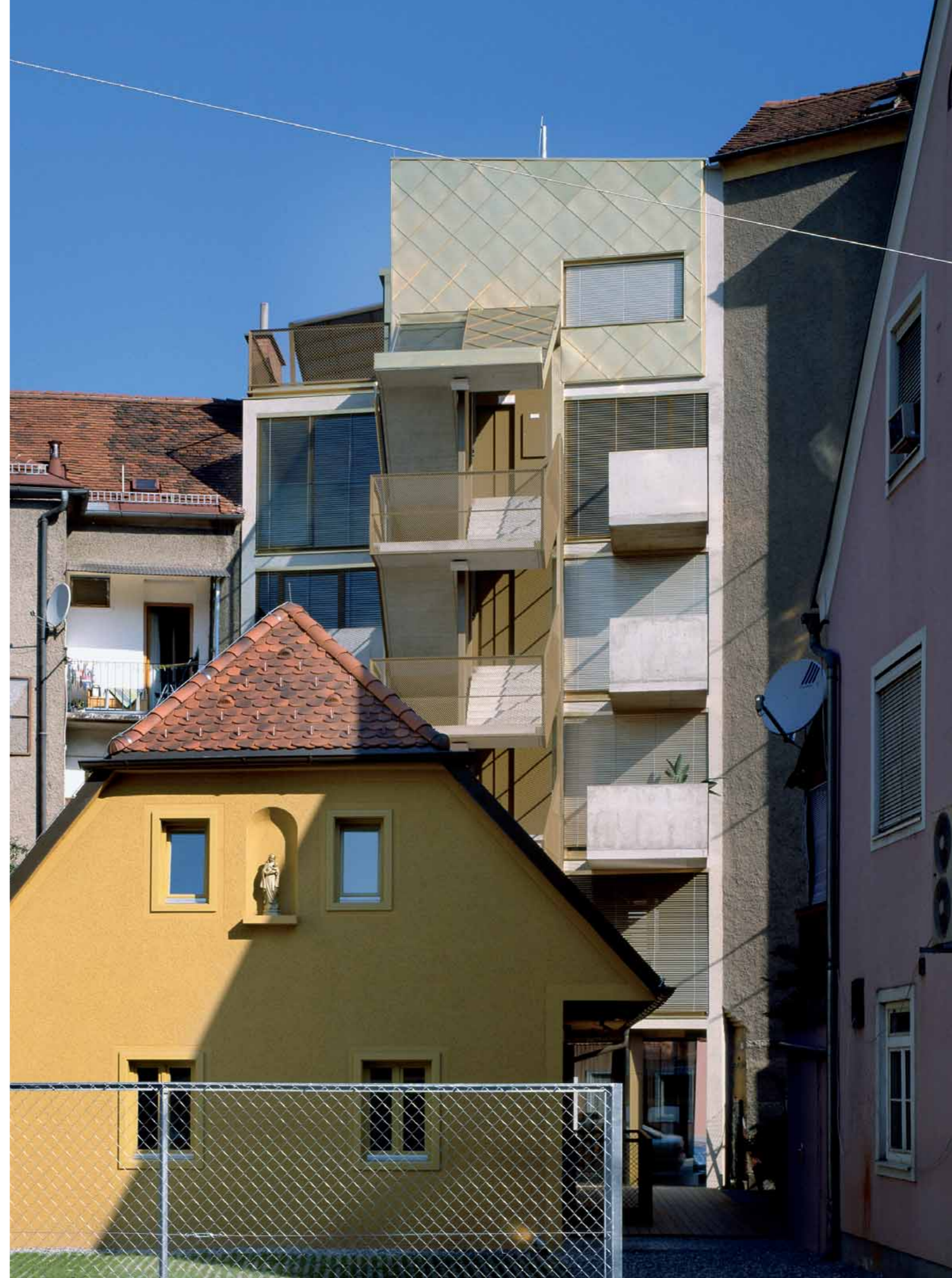
ing from the 18th century. It was restored and coated with a gold-coloured paint (the building substance is symbolically conserved with a 'gold coat' for the ensuing ages).

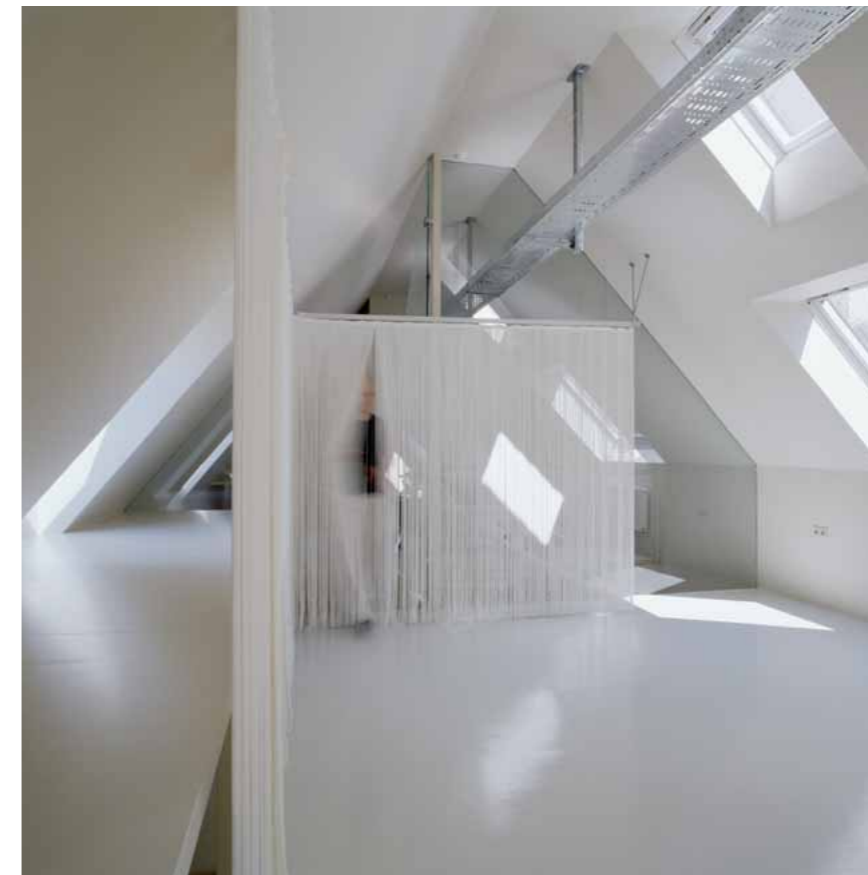
The collaboration of the architects and project developers Andreas Reiter, Peter Schwaiger, Martin Lesjak, and Bernd Steinhuber began during a design seminar at Graz University. Here they had got to know and regard each other, before they founded the architectural practice Innocad in 1999, after passing their diploma. As luck would have it, all of them had individually dealt with the narrow building site of the 'Golden Nugget' during their studies. Four different design concepts had been developed. These days the young architects pursue a common principle. The 'recipe' sounds simple, which they had developed as their logo and which can be traced back to a central piece of furniture in their former office: Seven golden squares – and innumerable possibilities to combine them – form the logo's construction set and since June 2005 also the window areas distributed in the façade of their new office, the 'Golden Nugget'.

The 'Golden Nugget' is the first building

the four architects have realized at their own risk and for which they especially founded the project development firm 99 Plus. Presently they are building two other houses at their own expense. The undertaking had been a courageous step, admitted the young entrepreneurs. The wide acceptance of the 'Golden Nugget' however proves that courage yields fruit: All seven apartments had already been sold before completion, and the city of Graz widely praised the building: At the 'International City Forum Congress' it was presented as an 'outstanding example for the treatment of modern architecture in historical urban districts'.

The Innocad office occupies the ground floor and the two-storied courtyard building. An open ramp leads to the staircase providing access to the apartments. The corporate identity of the young architects is consistently translated in the interior design: Gold-painted lecterns, printed or illuminated wall elements and curtains equally emphasize the corporate presence and the communicative character of spaces opening up towards the street. The prevailing attributes are gold-painted ceilings and crude fair-faced con-





Opposite and Left The historical courtyard building was internally completely designed in white. Light entering the space through the roof surfaces is effectively stage-managed on the neutral background.

crete. On the contrary, the courtyard house interior is entirely white (a rest area not only for the eyes).

White ceilings, white floors, even light fittings and curtains, the lattice steps, and net-like balustrades form a neutral, almost unreal scenery. The homogeneous white background reflects the light entering through the inclined roof onto wall and floor surfaces, whilst offering freedom, retreat and opportunities for thoughts and their originators. In the calm of this space, which is sheltered from the street noise (and occasional customers), interne sit-ins, meditative moments and creative breaks take place. The apartments on the contrary observe the 'golden' principle of the open areas facing the street: Organized in pairs they are accessible via a central platform stair, which from the first storey upwards projects from the building mass as a filigree, seemingly weightless structure. The balustrade is reticulated, like in the courtyard office building; the bottom plates and balcony parapets are made from fair-faced concrete, which can hardly be distinguished from the façade's gold-coloured metal coating. The two-storied penthouse

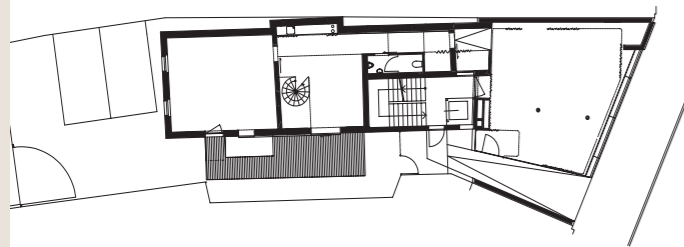
forms the crowning termination, which offers wonderful views to the surrounding from its generous terrace that stretches across the complete depth.

According to the planners and client, the apartments address a clientele, who esteem the value of the architecture and appreciate the fact 'that we offer unconventional, well cut and flexible living environments, which are otherwise not to be found on the market' (Innocad in a conversation with the architecture critic Oliver Elser). It is exactly these people, the four architects can be classed among, and to whom they refer to as 'urban people': sophisticated and young, self-conscious and educated above average. Even when the district, in which the 'Golden Nugget' is located, is amongst property experts considered as not being a top location (on the edge of the historic part of town, which is classified as World Cultural Heritage; in á zone, the Graz residents refer to as 'shards district'), it means a considerable added value for the occupants: transparency and openness of continuous floor-to-ceiling window areas on the side deliberately turned towards the public view,

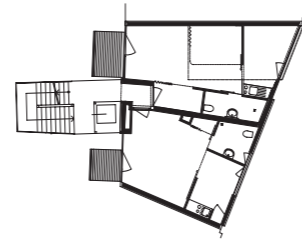
which suggest communication: the façade as shop window, internally as well as externally. Occupants preferring the layout to be less open, on a temporary or permanent basis, will use curtains or flexible partition elements. Again the rule applies: Appearance and texture are noble, gold is the predominant colour. Effective is the contrast to the crude fair-faced concrete walls and the white, individually designable wall and ceiling sheathing, onto which the user can perfectly well paper a 'blossom pattern', 'when he so desires' (Innocad). This is a suggestion of the young architects for all those people, who have not succumbed to the charm of bare concrete or the golden textures of curtains and partition elements.



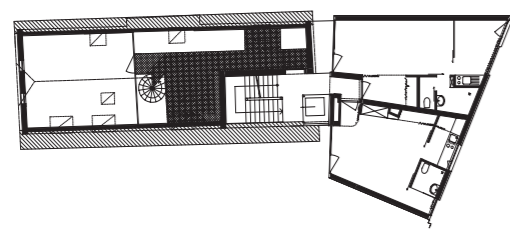
North, south and east elevations



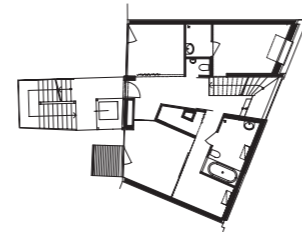
First floor



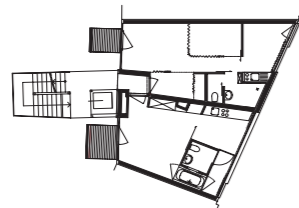
Fourth floor



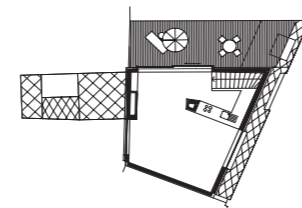
Second floor



Fifth floor



Third floor



Sixth floor

Facts

Location	Grazbachgasse, Graz, Austria
Building type	Residential and Office Block
Client	99 Plus Projektentwicklung und Bauträger GmbH
Architects	Innocad Planung und Projektmanagement GmbH
Completion	2005

Opposite The 'Golden Nugget' integrates into the existing building structure due to its colouring and cubature, without being subordinate. Quite the opposite: The golden façade has a strong presence and emphasizes the building as a unique unit.



SUNNY SPACE IN THE ATTIC
ARCHITECTS' OFFICE IN LJUBLJANA

Facts

Type of building	Reconstruction / interior design
Client	Maechtig Vrhunc Arhitekti d.o.o., Ljubljana
Architect	Tomaž Maechtig / Maechtig Vrhunc Arhitekti
Location	Ljubljana, Slovenia
Completion	2004

The two young Slovenian architects Tomaž Maechtig and Ursa Vrhunc had already spent a long time looking for a suitable location for their new office when their attention was drawn to an art-nouveau building in the city center of Ljubljana. Protected as a historic building, its outside could not be changed but the run-down attic had sufficient spatial quality to make it possible to adapt to the functional and aesthetic requirements they envisaged for their architect's office. As is usually the case when architects plan their own office, Maechtig Vrhunc Arhitekti were not only interested in having modern 'functioning' premises (the heating, electrical wiring and data lines, for example, had to be completely renewed) but also wanted an office atmosphere which, in everyday business, would spur on the young team of architects to their highest performance. In line with the way in which MVA works, the rooms were set out so as to be as open as possible. A walk-in wall cupboard accom-

modating the auxiliary rooms such as a tea-making kitchen, a toilet and a store nestles against the rear wall. A gallery for resting and as an additional work space was created on a ceiling suspended from the rafters. New skylights on two levels light up the office space, which is completely white except for a grey-green carpet. With the exception of the desk lamps, all artificial sources of light which are absolutely essential for the frequent night shifts in the office are accommodated in the "wall cupboard" zone. After the sun goes down, they bathe the cool white of the walls and furnishings in a warm yellowish shimmer.



PHOTOS BY BOR DOBRIN



2

1. Protected as a historic building but no longer in good condition: the art nouveau building in the city center of Ljubljana where Tomaž Maechtig and Ursa Vrhunc found a new location for their office.

2. The auxiliary rooms are located in a walk-in wall cupboard element in the rear area of the attic.



The colour white dominates the interior. Skylights ensure that all the workstations receive the same amount of light.

EMBEDDED IN NATURE SEEHOTEL AM NEUKLOSTERSEE IN NAKENSTORF

Facts

Type of building	Hotel
Location	Seestraße 1, Nakenstorf
Client	J. und G. Nalbach, Berlin
Architects	Nalbach und Nalbach Architekten, Berlin
Completion	2004

Much love of farms and attending to details have brought new life to an old DDR holiday settlement from the last century. For the architects Johanne and Gernot Nalbach, husband and wife from Berlin, it was an unexpected dream come trough.

The estate, 'Seehotel am Neuklostersee', used to be a classic farm. Only two hours by car from Hamburg and two and a half hours from Berlin you find this very peaceful and relaxing place surrounded by forests, flowery meadows and fields. It is situated in a protected area adjacent to a bathing lake, where geese, dogs, sheep and cats feel at home as well. In the year 2004, a new 'barn of bathing' as an 'archetype' complemented the existing 'barn of arts' and the two main buildings, the stone house with a restaurant and the hotel, thus forming a traditional three-winged farm, which is typical for the place. With much love of details the buildings have been furnished with a harmonious combination of old furniture from the master builder's time and new, modern furnishing and fittings. The mixture of new and old creates a very special charm, which varies from building to building.

The stone house has a touch of Mediterranean style with beach wood parquet flooring, bright colours and a furnishing characterized by the modern cottage style. Light-coloured armchairs with cloth covers, white-lacquered chairs and tables as well as excellent food invite you to linger on. The rooms have been decorated with different materials; the shades of the design carpet are reflected in the colouring of the room. Modern built-in wardrobes are set like sculptures and although contrasting with old pieces of furniture, such as a beautiful old table, the result is harmonious.

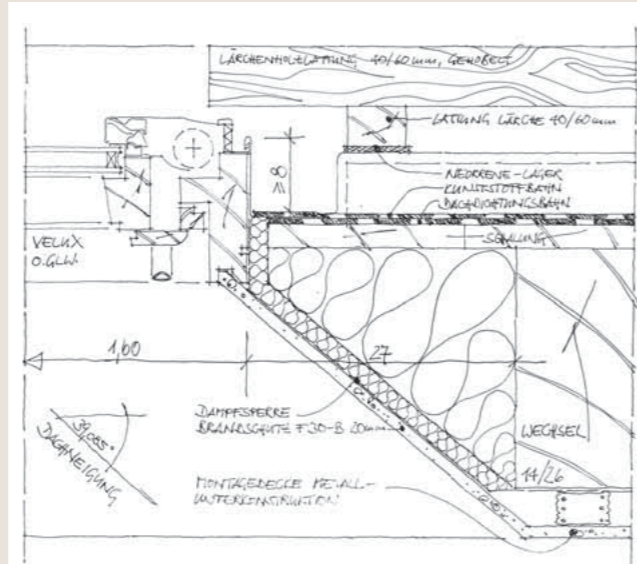
The 'barn of arts' is available for conferences, concerts, workshops and other arrangements. The girders

and oak staircases interact harmoniously with the terracotta flooring from old French monasteries. The rooms with winter gardens placed in front of them are fabulously light and nature finds its way in. Local granite stone pavement stretches from the terraces into the winter gardens, thus establishing the connection between the inside and the outside.

The 'barn of bathing' should appear as archaic as possible and this was realized by means of complex details, among others in the main façade. The lower part of the façade is decorated with Corten steel troughs with ivy elements. The building materials was intentionally aged to integrate the new building into the already existing ones right from the start. When opened the window shutters are in the window opening. When closed they flush with the façade.

The VELUX roof windows are placed almost at the same level as the larch tree battens, which underline the cubic effect on the structure. Seen from the ground plan the 'barn of bathing' has resemblance to an old Roman bathing house. In order to minimize the heat loss the adjoining rooms have been placed in groups around the swimming pool.

Like the two other houses the furnishing is influenced by the surroundings. You see walnut both on the floor and in the fixtures and limestone in the damp rooms. The walls are built from clay and straw giving the surface a slightly different, structured gloss. A bale of straw as coffee table expresses the concept of the symbiosis between nature and modern furnishing elements. Natural and artificial light have intentionally been applied as creative elements in the houses. Creole lights with mirror reflectors emphasize tables and walls. The roof windows bring the outside inside and add a special and cosy ambience to the rooms.



Detail



1. The swimming hall is upgraded with generous window elements. Details such as the tree stumps used as tables illustrate the architect's concept of allowing nature and a modern building to merge and become a unity.

2. The Seehotel at night – a monolith with a diaphanous outer skin, shimmering from the inside. With uniform outer walls made of larchwood, the upper floor and attic rest on a ground floor closely encroached on by the surrounding vegetation.



PHOTOS BY STEFAN MÜLLER

MONOLITH ON THE MILL POND RECONSTRUCTION OF THE KOTRČ MILL NEAR LIPNICE

Facts

Type of building	Conversion of a mill into a residential dwelling
Location	Near Lipnice, Czech Republic
Owner	Private
Architect	Lucie Kavanová, Prague

The Kotrč mill stands on the banks of a new man-made lake in the forest of Lipnice nad Sázavou in the Bohemian-Moravian uplands. Not only the granite walls of the almost 170 year-old structure are reflected on the surface of the water, according to the words of the architect Lucie Kavanova, but 'the entire valley and the spirit of this place (genius loci)'.

The architect from Prague planned to reconstruct the mill into a weekend house, which should also offer the possibility to live there in the long-term. She wrote about the starting condition of the project: "Almost nothing was preserved of the furnishings and fittings of the mill. The water from the mill stream had been diverted a long time ago. Just the rotten shaft protruding from the massive walls of the mill still left the impression that once a mill wheel had stood there."

First of all, natural stonewall gables were built up on the massive building, which is approx. 9 x 8 metres, to give the building its 'face', according to the architect. "This made the house slightly larger, so that it had a slight chance against the endless, high forests of the surroundings." The gables are made of the typically patterned granite for the area, like the metre-thick, old outer walls which, in Kavanova's opinion, "have the loveliest granite shading I know". The roof was then covered without the original cantilevered roof overhang.

New, displaceable shutters made of natural wood lighten up the facades. Their designer describes their effect: "Opened they not only signal the arrival of the owners, but also let

some life into the house, like the colours of nature in the surroundings. In particular, the picture of nature behind the large living room window is like a big TV screen, on which a story can be followed for hours on end."

About the interior of the room she says: "The inside of the house forms a dark labyrinth of smaller rooms. A house has to be spacious though, like the endless nature of the environment. And that was also the reason that we freed it of all items of no avail and allowed just its substance to come to the fore – its character".

The generously roomy interior has hardly any separating walls and doors. One enters the building through the dining room and kitchen, arrives one level higher in a living room with a stove and finally reaches the bedroom and bathroom on the top floor, which is made light by the skylights. The basement houses a wine store and a room for technical plant.

Reinforced concrete ceilings stabilize the already flawed building, and an additional interior insulation has been fitted behind a facing of plasterboard. The construction methods used for the conversion of the mill are relatively simple according to the type and site of the building. The filigree steel balcony, for example, which extends the living room towards the lake, almost appears provisional. The inner rooms form an unexpected contrast to the rustic outside: All walls are white plaster, a filigree steel-glass staircase leads to the upper storeys, and the bathroom under the roof is merely separated from the bedroom by a glass partition.

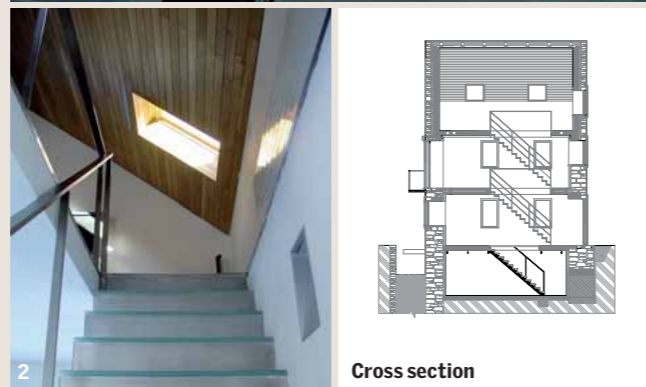
1. Through the panoramic window in the living room, it is possible to see the newly created mill pond. From the inside, the filigree balcony railing hardly interferes with the view.

2. A skylight illuminates the upper landing of the staircase. The filigree interior composed of steel and glass presents a striking contrast to the heavy rough exterior.

3. The old stonemasonry of the mill's massive stone gables can hardly be distinguished from the new parts in the upper area. The protruding tiled roof has been replaced by a sheet-metal roof that is almost flush with the wall.

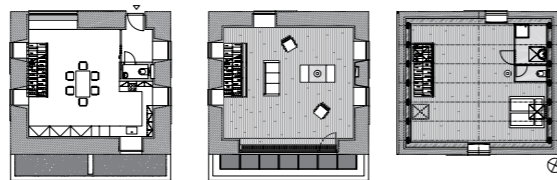


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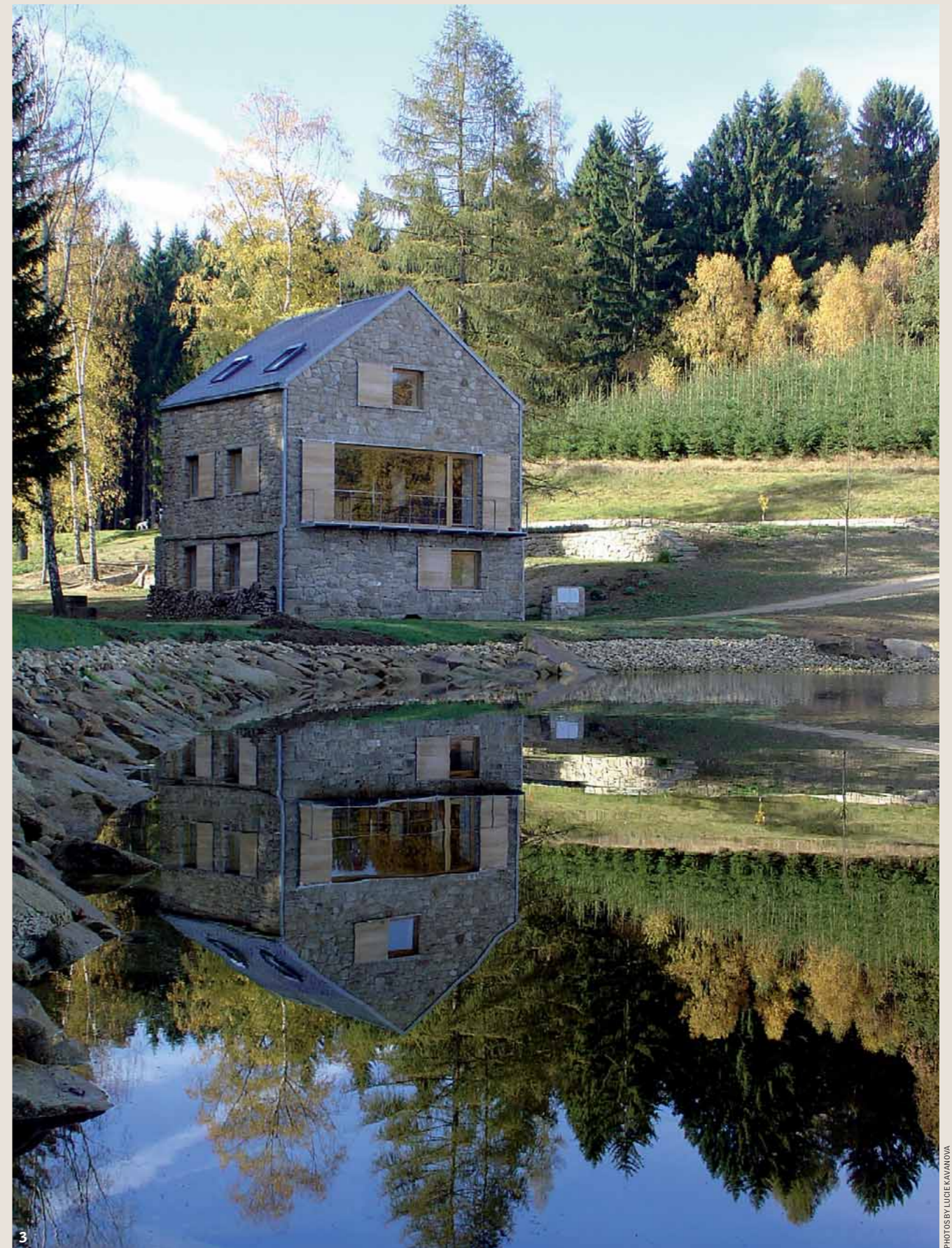


2

Cross section



Ground plans: Ground floor – Kitchen, 1st floor – Living room, 2nd floor – Bedroom and bathroom



3

PHOTOS BY LUCIE KAVANOVA

**Jorn Utzon Logbook Vol I
The Courtyard Houses
180pp. € 50 excl. VAT**

The books put their projects in context, positioning them in the wider oeuvre and throwing light on Utzon's design philosophy. They are easier to chew on than the full Weston, even if Utzon's career resists separation into bite-size pieces. Cumulatively, all these books will help to build the reputation of an architect who seems to have much to offer as a correction to our image-driven architectural culture.

aj review

**Jorn Utzon Logbook Vol II
Bagsvaerd Church
168pp. EUR 50 excl. VAT**

A complete record of all stages in the construction of the church at Bagsvaerd, from Utzon's initial idea, through sketches, construction, use and even correspondence during the production of the book, the documentation is so thorough it is nearly unbelievable. Sections on the acoustics, technical details of the organ, plans and photographs galore: there really is very little to compare with this series. If you have any interest in architects and their projects you are unlikely to spend a better GBP 35 in your life. A true labour of love.

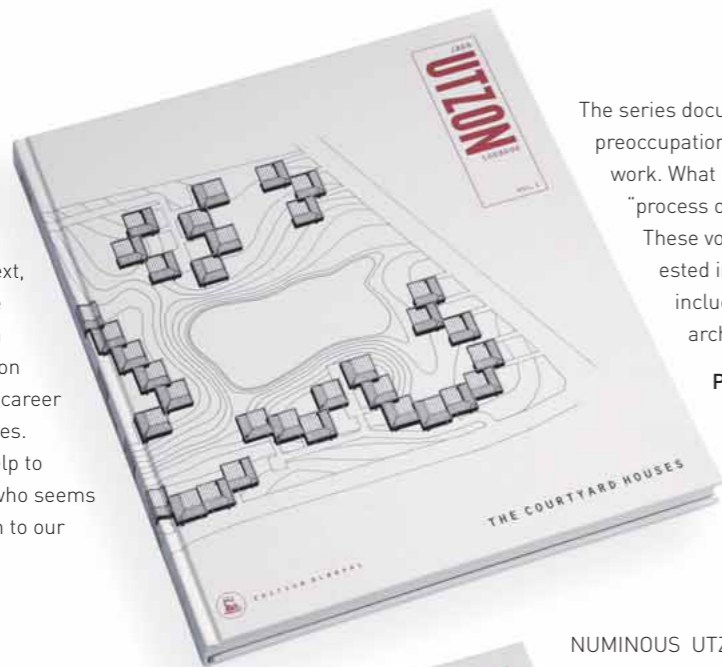
**RIBA Bookshops – Monographs
European architects**

There is far too much literature on architecture published throughout the world.

The critic's desk is covered with extended monographs presenting buildings that perhaps should never have been built, academic studies whose readers see no reason for them to have been printed at all. I am therefore overjoyed when I have the chance to show my respect for an exceptionally important monograph.

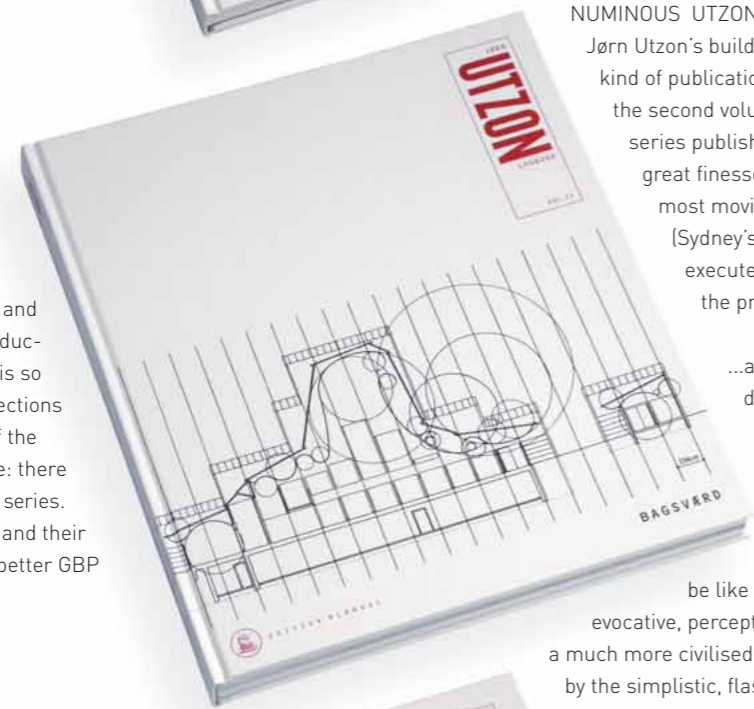
This book, which has been edited by John Pardey and written mainly in a most agreeable manner, tells the story of the buildings and Utzon's architectural intentions so successfully that it could only have been bettered by a movie or by visiting the site.

Esa Laksonen, ptah, The Alvar Aalto Academy



The series documents recurring themes and preoccupations which run through all of Utzon's work. What emerges is a rigorous yet free "process of work" rather than a style. These volumes are a must for anyone interested in Utzon which, to my view, should include anyone interested in the ability of architecture to inspire.

Plan Magazine – February 2006



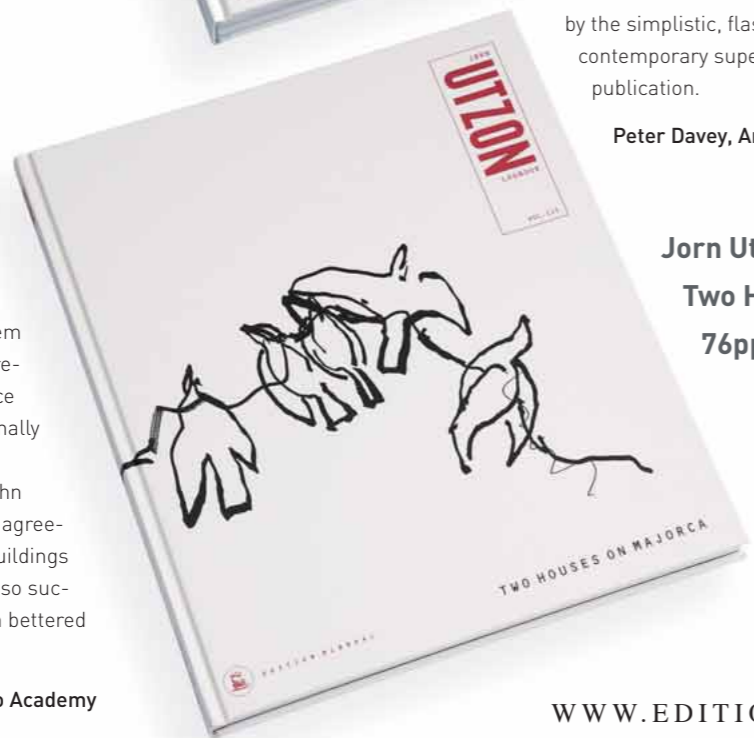
NUMINOUS UTZON

Jørn Utzon's buildings are at last getting the kind of publication they deserve. Bagsvaerd is the second volume in the Jørn Utzon Logbook series published by Edition Bløndal and, with great finesse, it analyses the architect's most moving fully completed building (Sydney's interiors never having been executed, though that may at last be in the process of correction).

...after much turning from text to drawings to images and back again, the building takes form in your mind. If only more architectural bookmaking in which the architect is involved with production could

be like this – clear, unaggressive, evocative, perceptive – we might start to make a much more civilised world than that encouraged by the simplistic, flashy handling of the work of contemporary super-stars in most contemporary publication.

Peter Davey, Architectural Review



**Jorn Utzon Logbook Vol III
Two Houses on Majorca
76pp. € 40 excl. VAT**



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VELUX DIALOGUE

The EAAE Prize: Setting the agenda for architectural education

WRITINGS IN ARCHITECTURAL EDUCATION

By Per Olaf Fjeld.
Photos by Jacob Boserup.

The EAAE Prize aims to stimulate original writings on the subject of architectural education in order to improve the quality of architectural teaching in Europe. Organised biannually the competition focuses public attention on outstanding written work selected by an international jury. The EAAE Prize was first awarded in 1991 and has been sponsored by VELUX since 2001.



In reading the 75 papers of the 2003–2005 EAAE Prize: 'Writings in Architectural Education', I realized how important this competition is for our teaching community. It clearly sets a base for a much needed discussion about the content and direction of architectural education. It is easy to forget that what is taught and how it is taught will have a direct impact on our built environment.

Architectural education in both Europe and North America has no common goal or direction apart from a very simplistic or basic understanding of what architectural education should entail. Each school strives for an identity or direction that suits for the most part the immediate needs of the region, of the school, its students and their future employers. Each school sets its own course in the hope that its pedagogical direction and content will fulfill these immediate demands and at the same time miraculously anticipate future needs. As a whole, the competition material revealed that we know very little about each other, the way we teach, and the content from which we teach and where priorities lie within a given content. It is here EAAE has

a future mission and responsibility to collect and make visible the pedagogical methods and content of the various member institutions, not only as a catalogue for students to pick and choose a school, but as a platform for discussion. We know far too little about the total spectrum of teaching institutions, and because of the lack of precise, ready information about other schools, we present pedagogical methods and theories as new or inventive over and over again. In a sense we spend so much time focusing on the 'new and inventive' that we do not have the capacity to study and compare similar methods and theories from other regions or other schools. This is clearly an area in which EAAE can do more.

There is no simple answer, no given approach to architectural pedagogy, but rather a continuous search and readjustment. This is directly reflected in the diversity of architecture itself. Teaching requires creative thinking, intuitive sensitivity and most of all concentration. Let us focus for a moment on the word 'knowledge' as it was presented in various texts. Several papers treated 'new knowledge' as an isolated or

separate entity. 'Old' or 'existing' knowledge is the basis on which 'new' knowledge is developed and understood. Is existing or traditional knowledge less relevant because of age? If this base 'old knowledge' ceases to be relevant other than as a short-term factor, methods and principles of the past will reappear as new. We are so preoccupied and fascinated by newness, we tend to pass over or even forget the principles and situations from which new knowledge originated. The shifting demands of our result-oriented information society clearly tend to produce a short-term memory, but how truly creative and fruitful this will be is still unknown.

There is clearly a deep concern over the changes taking place within architectural education in respect to the comprehension and application of past and present knowledge. Pressure from the information society to be simultaneously precise and progressive also affects the role of architecture and creates an uncertain relationship to culture and cultural definitions of content. Again it is not enough just to look ahead; we must also have a clear cognizance of what we leave behind.



Far left Per Olaf Fjeld, professor and former rector of the Oslo School of Architecture, was the chairman of the jury for the EAAE Prize 2003–2005. His résumé after reading the 75 articles which were submitted: 'The enormous interest in architecture and design that we experience today in the media has helped take architectural education out of its ivory tower, but it has not eased the pressure on education to define its position in relation to content, method and ideology.'

The jury of the EAAE Prize 2003–2005 consisted of Per Olaf Fjeld (chairman), Peter Mackeith, Juhani Pallasmaa, Dagmar Richter and Alberto Perez Gomez.



Computer technology is unquestionably a core instrument in today's information society. We are more and more dependent upon it to produce ready information that can both help and influence architectural realization, but very few believe that these instruments are able to identify new content, or give the current architectural situation direction. The technology has no conscious capability beyond direct and specific problem-solving. The limitations of the new technology in relation to both architectural education and practice will be a major challenge if architecture is to be more than direct problem-solving. The question is then, what is the role of an architect, and what is the role of architectural education? What is the task architecture is expected to solve? Is our mission also one of promoting an architectural search for and comprehension of content? If so, then the skill and knowledge in use within the restrictions and limitations of the information society are not enough to give rise to an architectural curriculum. However, very few papers questioned the importance of the built environment as a continuous stage for our daily life, but rather the papers concentrated upon the importance of being viewed and finding form through many different conceptual attitudes. Architectural connotation and its relation to human behavior in a broad sense have no limitations except the limitation of architecture itself. Nevertheless, in the hands of commercial interests, the information society can strategically use this openness to constrain and influence choice

in relation to both knowledge and know-how. Commercial or political interests can influence architectural content in such a way that it validates motivations outside the realm of architecture, and content would remain primarily focused on commodity.

Architectural research and architectural theory are now a permanent part of the curriculum in most schools, with the aim of broadening students' understanding of the subject and further developing its content. An expanding perspective is evident, but have we been able to merge the changing attitudes brought on by research, theory and new technology into the physicality of architecture, beyond a primitive delight in virtual reality's images and quick access to bits and pieces of information? Yes and no. To some extent this expansion has given rise to a new debate about the technological aspects of architecture. It has also influenced the formal aspects of architecture, and theory has launched new conceptual discussions. But the expansion has not been able to give architectural education common strategies and frameworks for the future.

Another point that seems to concern many is the future validity of the studio in the computer age, and what if any changes are being made. Here is a curious point, the studio prior to computer drawing meant different things to different schools and in different regions. It is true that the drawing studio in most schools was the core of its architectural pedagogy, but the structure, discipline, hierarchy, the number of stu-

dents and the expectations could be quite different. This means that the problems and solutions associated with incorporating computer drawing into the studio change slightly from school to school and nation to nation. Yes, sketches are rare, drawings are locked to machines, models occupy the desks, and the interaction between students and teachers and between students themselves is perhaps less impulsive. But as the original studio was different for each school before computers, so the internal structure of each studio is also different today. We need a better understanding of how studio teaching has evolved in the various schools and why. The challenge of inventing a studio model that can generate a new type of openness both in terms of the work process and the relationships between students and between students and teachers is important if the studio model is to survive.

Architectural education faces several difficult adjustments. In its use of technology, it has incorporated numerous technological innovations in order to satisfy the information society's fast pace, but the optimism in relation to technology's potential to improve life through the built environment is perhaps fading in some areas. On one level, there is the architect's handling of computer technology and on another the machines' capacity to handle objects or intended objects as limitless. And yet architecture is about space: the use and comprehension of space on all levels. Unfortunately the computer's spatial capacity and vocabu-

lary do not necessarily connect with all the levels of comprehension of space inherent to architecture. The machine presents a spatial assumption quickly and easily, but we come to the computer with our hard-earned, life-long understanding of space, not just physical but also social and psychological. This presents architectural education with a very difficult and often confusing situation. The balance between the virtual and the physical and their interaction on many levels have put great demands on today's architectural curriculum. The time allotted to comprehend and manage the complexity of the machine and the time given to architecture has become an academic battleground.

Several papers focus on what they see as a gap between architectural education and the profession. It is very clear that the updating of computer technology and the knowledge required due to the development of new materials is important for the profession. But is everything in this rather complex building package of equal interest for architectural education? Some suggest that the schools should be run more like an architectural office, and that the studio should take on real clients and make real buildings. Or at least that, before the student leaves the school, he or she must have erected a small building or a room in the scale 1/1. An internship of at least one semester is suggested in several of the papers. We have heard these suggestions before and we will hear them again, but a general agreement is far away. Each country, each school makes its own

decisions and takes its own stance on these matters. The debate between the profession and the educators continues. Educators in general will continue to face the dilemma of choosing between the best interests of the students' long-term professional life versus education directly related to the demands of the immediate job market.

There is a certain agreement, however, that architecture is pursuing and in need of new content. Curiously, few papers applied the essay question to many of the most pressing challenges that architecture will eventually be forced to face, such as ecological concerns, providing shelter for the displaced or homeless, and not least the use of material and its corresponding energy in relation to the world's ever-growing population. We have major physical and internal problems, but these problems are seldom the recipient of this new knowledge, and they are even more rarely the source of new knowledge and invention. It is rather strange, or typical, that architectural schools in general focus so little on these major and critical problems.

The 'information society' does not necessarily offer any help or direction in relation to architectural content, just as it does not offer or depend upon a particular culture or belief. One paper reminds us that we have a tendency to forget the difficulties of creation, and to take the creative act for granted in assuming that information and know-how alone can replace creativity. There was also the critique that many architecture schools



teach the physical aspects of architecture from a distance, as an abstraction, and thus a deeper and more complete understanding of architectural space is often compromised, because the skills needed to understand physical space, material and volume are replaced by skills needed to understand virtual space, material and volume. This process is both interesting and exasperating. The shift between two realities supports a diffuse sense of unlimited choice and material.

We must also be aware of the rather complicated architectural language that has evolved in recent years. I will contend that in reading the 75 papers, the language and its structure was often far more complicated than the actual complexity of the content. Yes, it is important to expand architectural content to incorporate many academic areas, and it is important that our vocabulary grows in relation to this content. But it is also important to remember that architecture for all its virtual invention is still earthbound, and, for most, a profession. The architectural profession has undergone great changes due to technological inventions over the past 50 years. Never has the profession been so in need of the reflections and interpretations of architectural educators and researchers. For this reason it is essential that we express our thoughts with clarity and precision, and that our discourse retain some form of accessibility in relation to the profession in general. I am aware that there is a very subtle balance within this argument and this balance is extremely fragile. At a time when more and

more students take architectural doctorates, architectural research is more popular than ever, and this research has no clear overall definition or limitation, we produce innumerable papers and spend enormous amounts of energy in this field we call 'architecture'. But does this really bring architecture forward? Hopefully it does, and I think if any architectural forums can help, it is those that bring architects and institutions together to investigate and discuss architectural education. Therefore I am proud to be part of this competition, as your papers set the stage for an important and essential discussion. The enormous interest in architecture and design that we experience today in newspapers, magazines, TV and "easy-read picture books" has helped take architectural education out of its ivory tower, but it has not eased the pressure on education to define its position in relation to content, method and ideology.

Per Olaf Fjeld, professor and former principal at the Oslo School of Architecture, began his architectural career in 1973 in the offices of Norwegian architect Sverre Fehn. He has been a guest professor at University of Arizona Architecture in 2003 and a board member of the European Association of Architectural Education (EAAE) since 2001, where he was recently elected as president.

EAAE

The EAAE is an international, non-profit association committed to the exchange of ideas and people within the field of architectural education and research. The EAAE aims at improving the knowledge base and the quality of architectural and urban design education. Founded in 1975, the EAAE has grown in stature to become an institution fulfilling an increasingly essential role in providing a European perspective for the work of architectural educationalists as well as for concerned governmental agencies. The EAAE numbers more than 100 active member schools in Europe from the Canary Islands to the Urals, representing almost 5,000 tenured faculty members and more than 100,000 students of architecture from undergraduate to doctoral level. The association is establishing associate membership worldwide. The EAAE addresses a variety of important issues in conferences, workshops and summer schools for young teachers. The Association publishes and distributes the proceedings. It also grants awards and prizes. For more information; See EAAE homepage: www.eaae.be.

European Association for Architectural Education
Association Européenne pour l'Enseignement de l'Architecture

WWW.EAAE.BE



WRITINGS IN ARCHITECTURAL EDUCATION

Representation in Architecture

Communication – Meaning – Visions

At the present the tools of the architect are in the midst of an accelerated process of development and change. New technology has opened up for a greater design complexity and spatial variation. The digital working process offers a capacity of 2D and 3D visualisation that simply was not possible half a century ago. This new mode of communication has changed architectural representation at every level. One may argue that this will change architecture, but in what way? What, then, is representation in architecture today? Does representation have its own architectural content and agenda, and what impact will this have on architectural education?

The EAAE Prize is open to all members of the teaching staff of the EAAE member schools of architecture, or individual members of the EAAE.

Download the prize invitation and registration form: www.eaae.be or contact the Organising Committee v/ ebbe.harder@karch.dk

The deadline for contributions is October 12, 2006

EAAE PRIZE
2005-2007
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BROKEN GLASS

Glass in art and architecture
Editor: Wolfgang Becker
Wienand Verlag 2005
ISBN 3-87909-875-1

'Broken Glass' is the catalogue for an exhibition, which took place in autumn 2005 in Heerlen, the Netherlands, in the former Schunck department store (the so-called 'glass palace') which was renovated by Wiel Arets. The theme of the book is the meaning of glass in every imaginable cultural context – in sculpture, glass painting, architecture, literature, music and film. The texts in 'Broken Glass' are contributed by art and architectural historians, literary scholars and a film musician. However the prologue comes from notes to John Smith's film 'Slow Glass', in which a glazier from London reasons about the history and manufacture of glass. He recalls that although glass appears to be solid, it is in fact a liquid – we just don't live long enough to be able to notice it flowing.

Almost a third of the book is taken up with Wolfgang Becker's contribution entitled 'Art and Glass' in which the author introduces us to a world

of glass sculptures and glass installations. Becker comments knowledgeably on the works of Marcel Duchamp, Gerhard Richter, Mario Merz, Joseph Beuys and many other modern and contemporary artists and concludes that, "... however [it] seems that the work prevails, in which the authors attempt to illustrate the veritable traits, deceptions and illusions associated with glass." Iris Nestler concentrates far more on the craft of glass processing in her chapter on glass painting and 'studio glass', which explores the manufacture of art, small sculptures and vessels from glass. On the other hand, the Aachen-based architectural historian Manfred Speidel reviews some of the milestones which have been designed and constructed in glass architecture: Joseph Paxton's Crystal Palace in London, Walter Gropius' Fagus Factory in Alfeld in Lower Saxony, Mies van der Rohe's designs for a multi-storey building in Berlin and the fantasies of the 'Glass Chain' associated with Paul Scheerbarth and Bruno Taut.

Although most of the essays only scrape the surface of their subject area, 'Broken Glass' stands out by virtue of the fact that it contains a wide variety of perspectives. Glass has seldom been portrayed in a book in such a versatile way. However, it also becomes clear in the book that it is rare to find really demonstrative work with glass which spans all disciplines – even when it comes to architecture and visual arts. Could this be due to the fact that in our culture glass has recently been completely predominated by business and high-tech architecture? 'Broken Glass' was at least able to provide a rudimentary contribution regarding the rediscovery of the sensuousness of this material.

CONCRETE ARCHITECTURE

Author: Catherine Croft
Laurence King Publishing 2005
ISBN 1-85669-364-3

In architectural circles, concrete was and still is considered to be a controversial material. In recent years, it seems that the most versatile (and therefore often used without much thought in the past) modern trend in building materials has become presentable. In fact it is downright chic to be surrounded by buildings and objects made from concrete. New concrete compounds which make it possible to create ever flatter surfaces and ever narrower components have contributed in part to the popularity of this material, which Frank Lloyd Wright described in 1928 as follows, "...aesthetically it has neither song nor story. Nor is it easy to see in this conglomerate a high aesthetic property, because it is an amalgam ... cement, the binding medium, is characterless in itself. The net result is, usually, an artificial stone at best, or a petrified sand heap at worst."

It was not only Wright who later changed his attitude towards concrete. The author Catherine Croft, director of the Twentieth Century Society, refers to her book in the first sentence as "a celebration of concrete". She commences with a detailed essay on the history of concrete, in which she never makes the development of concrete technology and construction into the sole focal point, and instead chooses to also deal with the material's cultural significance. In the subsequent chapters (entitled Home, Work, Play and Landscape), which are arranged typologically and depict a total of 44 projects, the author always provides an insight into the design philosophy

of the respective architects alongside a description of the buildings. The examples in the final chapter, which fluctuate between landscape architecture and land art, underground cemetery complexes and the layout of urban areas clarify the fact that, in our constructed environment, concrete is by no means only significant when it comes to pure building construction. The book lends itself to being extended to deal more closely with the field of civil engineering. However, even in its current form, it impressively documents the functional and artistic diversity of concrete, with the use of fascinating colour photographs and illustrations. 100 years ago, William Lethaby wrote that concrete should only be used 'in highly civilized buildings' if it is covered by marble, gold mosaics or paint. 50 years ago, Louis Kahn claimed that it should be possible to visualise every step in the construction of a concrete building. Nowadays, architects who work with concrete engage in the whole spectrum between both extremes. The rigid dogmas seem to have been abolished and it is left to the creativity of each individual to make the best out of the conglomerate of sand, gravel, cement and water and an increasing proportion of chemical additives. It is presumably the variety of things resulting from it which have restored concrete to its current popularity.

THE ART OF WOODEN ARCHITECTURE

Author: Will Pryce
E. A. Seemann Verlag 2005
ISBN 3-86502-122-0
(English edition: Buildings in Wood
Rizzoli Publishers
ISBN 0847827461)

Wood is one of mankind's oldest building materials and has always been considered to be inferior to stone, as it doesn't last as long, is not as sturdy and burns easily. Therefore it is possible that even masterpieces of wooden architecture such as the Norwegian stave churches or the temple in the Forbidden City will always stand in the shadow of the large stone buildings of architectural history. At least according to the publishers, Will Pryce has written the first comprehensive history of wooden architecture ever to be published in the entire world. His book is unusual in several ways: Pryce is not only an architect and a self-confessed connoisseur of historical and contemporary timber constructions, but also a highly gifted photographer. From the title page to the very last footnote, 'The Art of Wooden Architecture' is all his own work and it is impossible not to respect him for this. The book is a pleasure to read, particularly due to the photographs, which do not lose any of their brilliance and sharpness, despite the book's double-page, 30 x 48 centimetre format. With the exception of Africa and South America, Pryce travelled all across the world in order to photograph timber constructions. However, as he states in the preface, he does not believe that his book needs to be completely comprehensive. Instead of following a chronological or typological structure, he approaches architectural history on

the basis of case studies, in which he describes the basic cultural and geographical conditions affecting each of the buildings as well as each of their peculiarities. Even Pryce's digression into contemporary timber architecture, in which he depicts buildings such as those by Jarmund & Vignasne, Thomas Herzog, Bruce Goff and Richard Leplastrier, comes across as an organic continuation of the preceding chapters. The attentive reader only misses out on the occasional design description when Pryce tries to explain something in words which would have been better depicted in a picture.

'The Art of Wooden Architecture' impressively depicts the diversity of the shapes and surface textures of wooden building which were created in centuries past by builders who mostly remained anonymous. However, Pryce also mentions the way that wooden architecture literally changed the world. For example, it is hardly conceivable today that the word 'Holland' actually originated from 'Holtland' (wood country). The task for the future of wooden architecture will be to find a balance between the destruction of resources and their ability to regenerate, as even 'renewable' raw materials will start running out at some point.

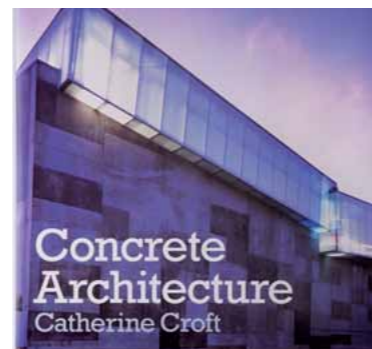
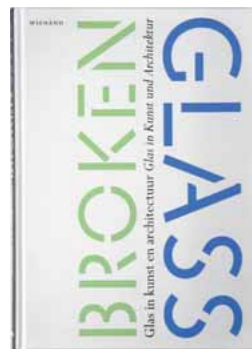
JØRN UTZON LOGBOOK

Volume II: Bagsværd
Edition Bløndal
ISBN 87-91567-07-6

In 2002, Danish publisher Torsten Bløndal released a remarkable book: the 500 pages -strong sizable monograph "Utzon" by Richard Weston - probably the ultimate book on the most important Danish architect of the past 50 years. Now, it would be far from the truth to assume that everything on the topic has been said and done: only three years later, the little Danish publishing house introduces three "log books" on individual buildings and building types that the meanwhile almost 90 years-old Utzon was involved in. On nearly 170 pages Vol. 2 introduces what is arguably the most important work of the Pritzker award winner on Danish soil - Bagsværd church in the Northwest of Copenhagen. Built between 1969 and 1976, this church has Utzon at the height of his creative power. "This is an architecture that is enormously simple and straightforward and gives the building a feeling of totality", Utzon himself stated in an interview with publisher Torsten Bløndal. This statement can be read on page 117 and - apart from the contents page - until then the book does not offer anything to read at all, the pages are not even numbered. In their book Bløndal and Utzon consciously rely on the power of the images and drawings. They illustrate Utzon's skillfulness to bring together even the most common industrial products and make them into buildings full of poetry giving visitors of his church "the reassurance of something which is built, not just designed", as he later wrote on the Bagsværd church. Each single

detail of the building was designed by Utzon himself; he personally imported the tiles for the handrails from Mallorca and even specified how deep the nails of the church's furniture were to be hammered into the wood. The second part of the book reveals the same obsession with details: with sometimes remarkable precision the participants in the project - Utzon himself, his son and erstwhile assistant Jan, the structural engineer Godtfred Jensen and the vicar of Bagsværd church, Svend Simonsen - recall their memories. The volume is finished by three analysis of "external" consultants: Bo Mortensen describes the acoustics of the church, Utzon-biographer Richard Weston reflects on possible role models and sources of inspiration for Utzon and Martin Schwartz analyzes (according to Utzon) "the most important thing in this church": the light.

The "logbook" tells us as much about Jørn Utzon's building as about the man himself: it portrays him as an advocate of a vernacular, human modernism as well as a representative of a generation of architects who defined it as their very duty to assume total control over a project - in all job stages and all details. Apart from detailed drawings, of which Utzon produced rather few in number anyway, this logbook provides a comprehensive record of Bagsværd church. Hence, Utzon's last sentence in his interview with Torsten Bløndal equally sums up the entire book: "I think what I've told you about the church now - I've gone from the first rough idea all the way through and down to the details - it's all there. We haven't anything else to talk about."



BOOKS

RECOMMENDATIONS
European architects recommend
their favourite books in D&A.



- 1 **Much Untertrifaller**
- 2 **Chris Leung**
- 3 **Piergiorgio Robino**

1 MUCH UNTERTRIFALLER RECOMMENDS

Richard Serra – Dirk's Pod
Steidl Verlag
ISBN 3-86521-089-9

Dirk's Pod, one of the largest permanent installations by the American sculptor Richard Serra, was erected on the Novartis AG campus in Basel in May 2004. When this large sculpture was unveiled, a 128-page accompanying book was brought out by the Steidl Verlag from Göttingen. Besides articles by Daniel Vasella, Silke von Berswordt-Wallrabe and Richard Serra, it contains numerous photographs by Nic Tenwiggenhorn as well as Dirk Reinartz. Reinartz, who died in 2004 and was Serra's long-standing friend and companion, has captured the tedious production process of the ten steles. The photographs of the final assembly and the completed sculpture were taken by Nic Tenwiggenhorn.

**Cruelty and Utopia
Cities and Landscapes
of Latin America**
Jean Francois
Lejeune (Editor)
Princeton Architectural Press
ISBN 1-56898-489-8

This collection of illustrated essays describes the history of those 'other' American metropolises, such as Buenos Aires or Mexico City. Duly-authored experts, amongst them Carlos Fuentes, introduce the single cities; they describe the development of the slums as well as the masterpieces of Latin-American architects from Luis Barragán to Lina Bo Bardi. The articles are accompanied by illustrations, which interpret the reality of Latin America from an artistic perspective. Also printed is a revised translation of 'Leyes de las Indias' from 1573, containing numerous stipulations for urban planning, thus decisively influencing the form of Spanish colonial towns.

**Carlo Mollino
Architecture as Autobiography**
Thames & Hudson
ISBN 0-500-28583-7

Carlo Mollino (1905–1973, Turin) was one of the most original and simultaneously enigmatic architects and artists of the 20th century. Mostly critics maligned him for his non-conformist attitude. His works, which comprised buildings, interiors and pieces of furniture, as well as photographs, scripts and stage sets, combined the influences of futurism and surrealism. The monograph published by Thames & Hudson concentrates on Mollino's interior furnishings and furniture designs: Eighty masterpieces of his works, which predominantly resemble sculptures, are documented by rarely published documents and photographs.

**Su Mangiarotti – architettura
design scultura**
Abitare Segesta
ISBN 88-86116-45-4

The architect Angelo Mangiarotti, born in Milan in 1921, is regarded as one of the most important protagonists of the Italian architectural scene. Nevertheless, the volume published in the series 'SU' abstains from recording the complete works of the much respected architect and urban planner. Forty partially unknown works from architecture, design and sculpture are presented in historic as well as recent illustrations, plans, sketches, and articles. Seventy per cent of his material was so far unpublished. Another stimulus for the reader is the enclosed essay on 'Constructive Systems in Architecture'. Mangiarotti himself has graphically designed this article.

2 CHRIS LEUNG RECOMMENDS

**Frei Otto – Complete Works
Architecture in the Digital Age:
Design and Manufacturing**
Hugh Leach, Branko Kolarevic
Spon Press (UK)
ISBN 0415278201

The 320-page book offers a comprehensive insight into the status quo of digital architecture, thus bridging the gap from the origins to the contemporary situation: How are computer-aided means applied in architecture and what influence do they have? How can they be favourably used in the future? Chris Leung: '... The availability of CAM (Computer Aided Manufacture) software and small-scale CNC (Computer Numerically Controlled) facilities has closed the gap between thinking about the design and its realization. The book raises the bar of expectation with accounts of individuals and practices at the cutting-edge of working with these tools.'

Dynamic Daylighting Architecture

Helmut Köster
Birkhäuser
ISBN 3-7643-6730-X
(German edition: Dynamische
Tageslichtarchitektur
ISBN 3-7643-6729-6)

'Dynamic Daylighting Architecture' is directed at architects, lighting planners, construction physicians, and air conditioning engineers. Helmut Köster is concerned with an objective that can only be achieved in a joint effort: the reasonable integration of daylight and solar energy in buildings. Chris Leung: "I was looking for a book like this for years, a thorough technical description of day-light and sun-light. [...] Just when you think that the author has made his point, you discover another way of looking at the way a space can be efficiently and naturally lit, harnessing one of nature's free gifts the sun."

The Technology of Ecological Buildings

Klaus Daniels
Birkhäuser
ISBN 3-7643-6131-X
(German edition:
Technologie des ökologischen
Bauens
ISBN 3-7643-6131-X)

The 302 pages of this book, which has been published in German and English, presents 'basic principles and measures, examples and ideas' (so is the blurb) on the topic ecological construction. Chris Leung: 'This book was a source of environmental design ideas during the office competition entry for the Aga Khan University competition. Since then the beautifully presented and clear diagrams the book contains have prompted many conversation around the potential to use the many different technologies and scenarios the book documents. It has and continues to be a bridge building aid in the office to start a conversation with enlightened engineers.'

Computer-Aided Manufacture in Architecture – The Pursuit of Novelty

Nick Callicott
Architectural Press
ISBN 0-7506-4647-0

Un-biased and easily comprehensible, but in a very detailed fashion Nick Callicott introduces the readers of his book to the secrets of computer aided manufacturing and its application in architecture. Chris Leung: 'This book is a favourite not least of which because it introduced me to many of the rapid-prototyping techniques that are available to designers that I am becoming increasingly familiar with, but more significantly for me the mode of engagement with them that this book advocates.'

3 PIERGIORGIO ROBINO RECOMMENDS

**MVRDV: KM3
Excursions on Capacity**
Actar
ISBN 8495951851

In 1998, MVRDV called attention to themselves with the weighty tome FARMAX. Now the architecture avant-gardes present the second volume "KM3" comprising of 1,200 pages. The book's theme is the re-discovery of the European city and presents three exemplary designs for Amsterdam and Rotterdam. As in many of their previous designs, MVRDV proceed from the unconventional layering of (urban) landscapes, which aim to contain the space required in the densely populated Netherlands.

Zaha Hadid: Architecture
Hatje Cantz
ISBN 3775713646

The book was originated in 2003 on the occasion of a Zaha Hadid exhibition in the Viennese Museum for Applied Arts. Amongst the numerous presently available books on Hadid it was the first to „document the artist's most recent project" (according to the publishing house). Illustrated are amongst other projects the Rosenthal Center for Contemporary Art in Cincinnati, the National Library in Montréal and the stage sets for the 2000 Pet Shop Boys world tour. Several, so far unpublished drawings and graphics by the London architect round off the volume.

The Snow Show
Lance Fung (editor)
Thames & Hudson
ISBN 0500238197

For the second time, the 'Snow Show' enthused tourists from all over the world during the 2006 Olympic Winter Games. It is the successor event to the first '2004 Snow Show' in Lapland, which Lance Fung presented in his book. Seventeen works of art, created in the co-operation of one architect and one artist each, are documented in more than 250 photographs, numerous drawings and project text written by the designers. Illustrated are not only the final results, but also the partially complex genesis of the perishable artefacts.

**Archilab
Radical Experiments
in Global Architecture**
Frédéric Migayrou
Thames & Hudson
ISBN 0500283125

In this book Frédéric Migayrou, Director of the Centre Pompidou Department of Architecture, presents 60 of the world's most innovative young architectural practices. Their answers to the questions on how we are going to live and work tomorrow and the day after are again and again surprising. Detailed practice profiles, more than 2000 illustrations, and texts of leading historians and critics of architecture make the 528-page volume a substantial source of inspiration regarding architectural design and visualisation

**DAYLIGHT &
ARCHITECTURE**
ISSUE 04
AUTUMN 2006

LIGHT

Dichroic Light Field,
New York, USA –
by James Carpenter

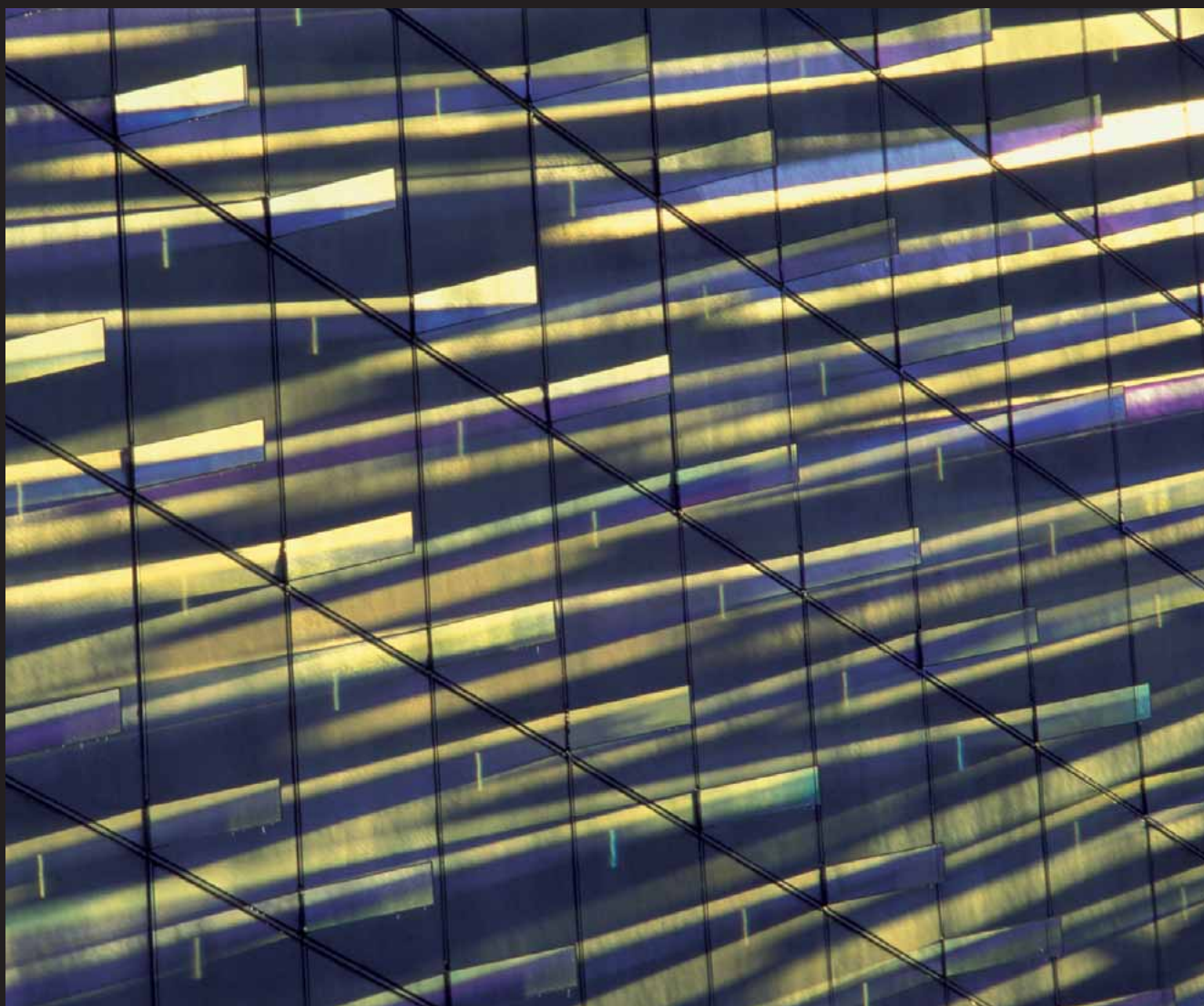


PHOTO BY DAVID SUNDBERG, ESTO



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