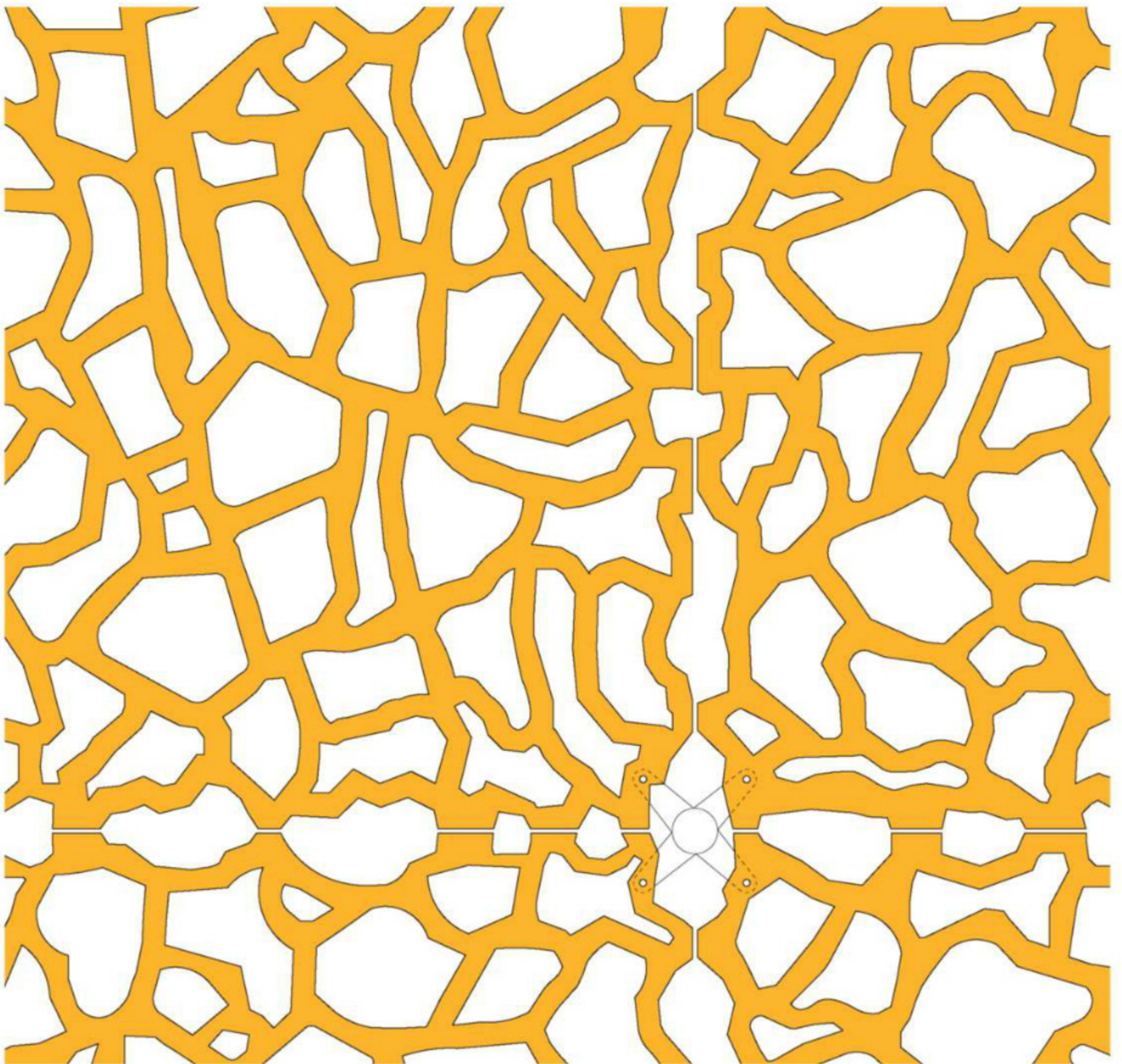


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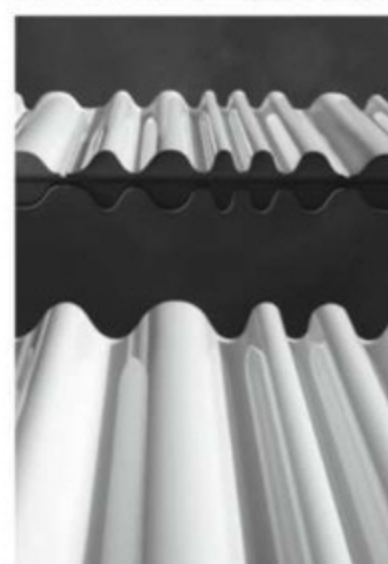
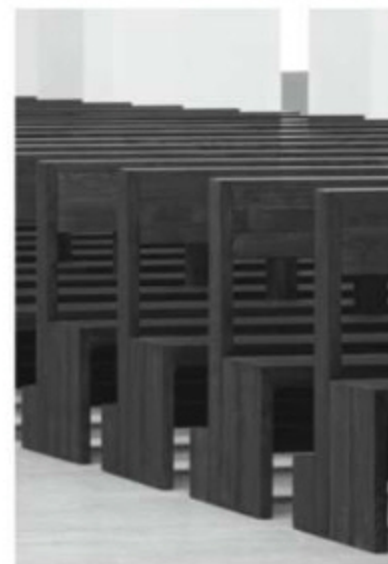
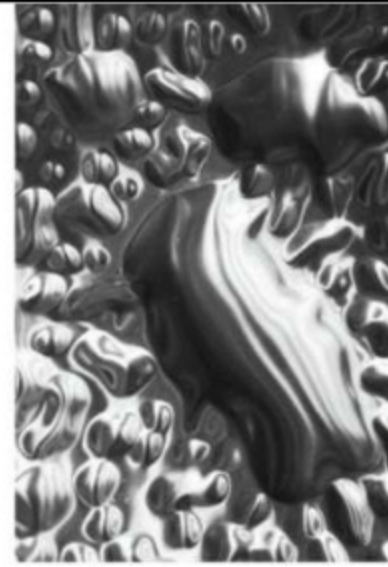
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Editorial

Materials and their surfaces are integral to architectural expression. Architects use them to bring their designs to life and to give buildings their unique character. But which strategies do today's leading offices employ to navigate the virtually inexhaustible variety of construction materials? In our Discussion section, Christiane Sauer and Andreas Gabriel shed light on the varying approaches of two offices that are noted for their sensitive use of materials: OMA (Rotterdam) and ippolito fleitz group (Stuttgart).

Architects and consultants employ different techniques to bring out the best in the materials used in this issue's buildings. In one example, the recently refurbished courtyard at a university in south London is dominated by a single building material: a reddish-brown brick that ties together the diverse surfaces (page 21). In other projects, various surfaces are juxtaposed to highlight their contrasting properties. The interplay of concrete, in an expressive implementation, and expanded metal, a material associated with industrial construction, vivifies the building envelope of a community centre on Lake Zurich (page 30). And in an educational edifice housing a performance space and departmental facilities in Karlsruhe, there is a palpable tension between the subtly shimmering, dark-toned, glazed ceramic surfaces and the adjoining radiant white stucco (page 24).

In our Technology section, we illuminate (at an even greater level of detail than usual) three innovative applications of materials and the accompanying development processes. We present an analysis of The Endless Stair – an exploration of the benefits of using hardwood in cross-laminated timber – which was shown at the London Design Festival. At the MUCEM in Marseille the focus is on the the large-scale and novel application of high-performance concrete in, among other applications, the mesh-like panels Architect Rudy Ricciotti cloaks the building in to achieve a fascinating modern-day version of chiaroscuro (page 60). SANAA, in contrast, wraps an industrial hall in Weil am Rhein in an elegant white curtain of undulating acrylic glass – seamless and without apparent fasteners (page 68). Here the material's raison d'être is not merely to serve as a manifestation of the factory's digitalised production techniques, but also to visually scale back its dimensions. The concept aims to achieve nothing short of dematerialisation.

Christian Schittich

Material Research at OMA

Christiane Sauer

Rem Koolhaas and his office are considered pioneers in the innovative use of materials. Early projects demonstrate how the architects began to reinterpret industrial, mass produced items by placing them within a new, architectural context and combining them with classic construction materials. One example is the Kunsthal in Rotterdam, completed in 1992. In this exhibition building plastic panels made of polycarbonate, for instance, were juxtaposed to classic, high quality materials such as exposed concrete and wood, similar to a collage. In the meantime these aesthetic experiments, considered radical back then, have become part of the commonly accepted and applied

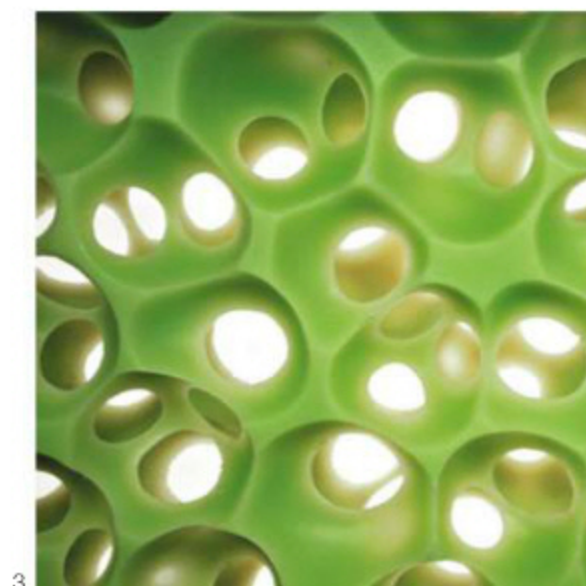
architectural vocabulary. To this day the office, situated in Rotterdam, New York, Beijing and Hong Kong, is still considered an incubator for experimental architectural and material concepts.

The centres of development: sample library and model workshop

Upon entering the headquarters in Rotterdam, the first impression is organised chaos: Designs are developed via countless models and material studies that pile up along the shelves and the desks of the workspaces. By use of samples and full-scale mock-ups, the office staff tests the real-life impression of their designs within the environment. Most of

all, the sample library, by now having reached a length of almost forty meters, is highly frequented within the design phases. It consists of portable compact storage units that house samples of all conceivable materials and in any possible size and that were ordered for particular projects at some point in time. Despite this existing filing system, when looking for certain materials the element of chance prevails more often than not – you look for something specific that doesn't happen to be there at that moment. But, within the stuffed shelves, you unexpectedly find a different material that opens up entirely new perspectives. In the course of time and during increasing project intensity, the

- 1 Night view of the "Prada Transformer". The steel construction can be seen clearly through the translucent foil cover.
- 2 Pavilion interior
- 3 Plastic foam for the Prada Epicenter Stores
- 4 Material study of the aluminium foam for the Fondazione Prada, Milan. The material is intended for use as wall paneling and at the same time for stiffening the load-bearing structure.
- 5 Wall panel made of plastic foam in the Prada Epicenter Store in Los Angeles



sample library tends to scatter across the entire office. For this purpose, its bits and pieces are reassembled in regular intervals. All samples that become impossible to find for the office staff and are distributed across desks and shelves are returned in an orderly fashion, and thus, become accessible to all once again. In addition, the workshop has just been modernized and is entirely in the service of experimentation. The focus in model building is on material, tools, and craftsmanship. Instead of a digital high-tech station, an old-fashioned architectural "experimental laboratory" was set up. Since their student days, particularly the younger office members are almost exclusively used to working with computer-controlled model building techniques such as laser cutting and rapid prototyping. Within the new "model lab" the opposite takes place. People work with cutters and paste, thus paving the way for experimentation. "Ideas can't be printed by a 3D plotter", according to OMA Associate Chris van Duijn, among other things responsible for material development within the design process.

Taking cues from the packaging industry: the Prada Transformer

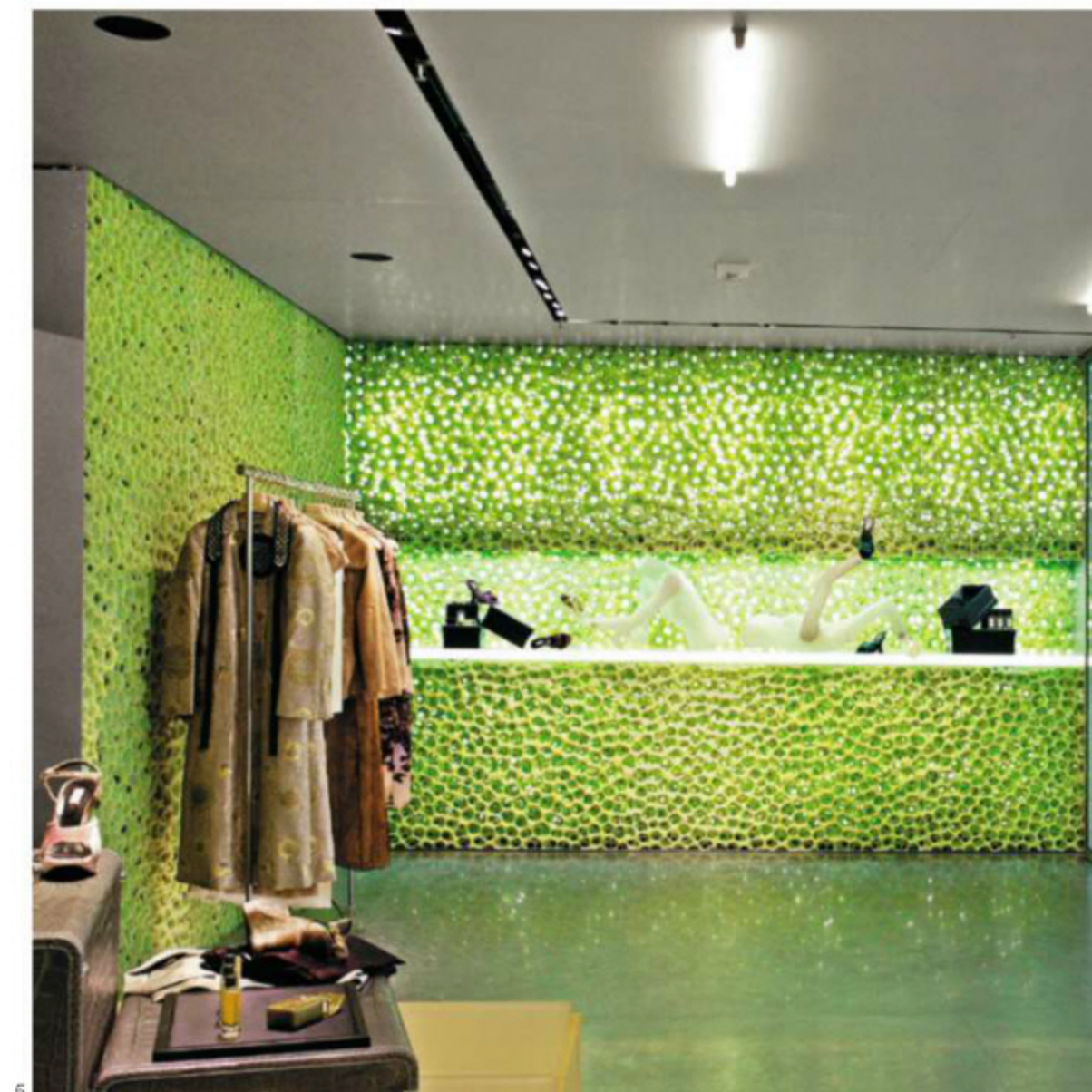
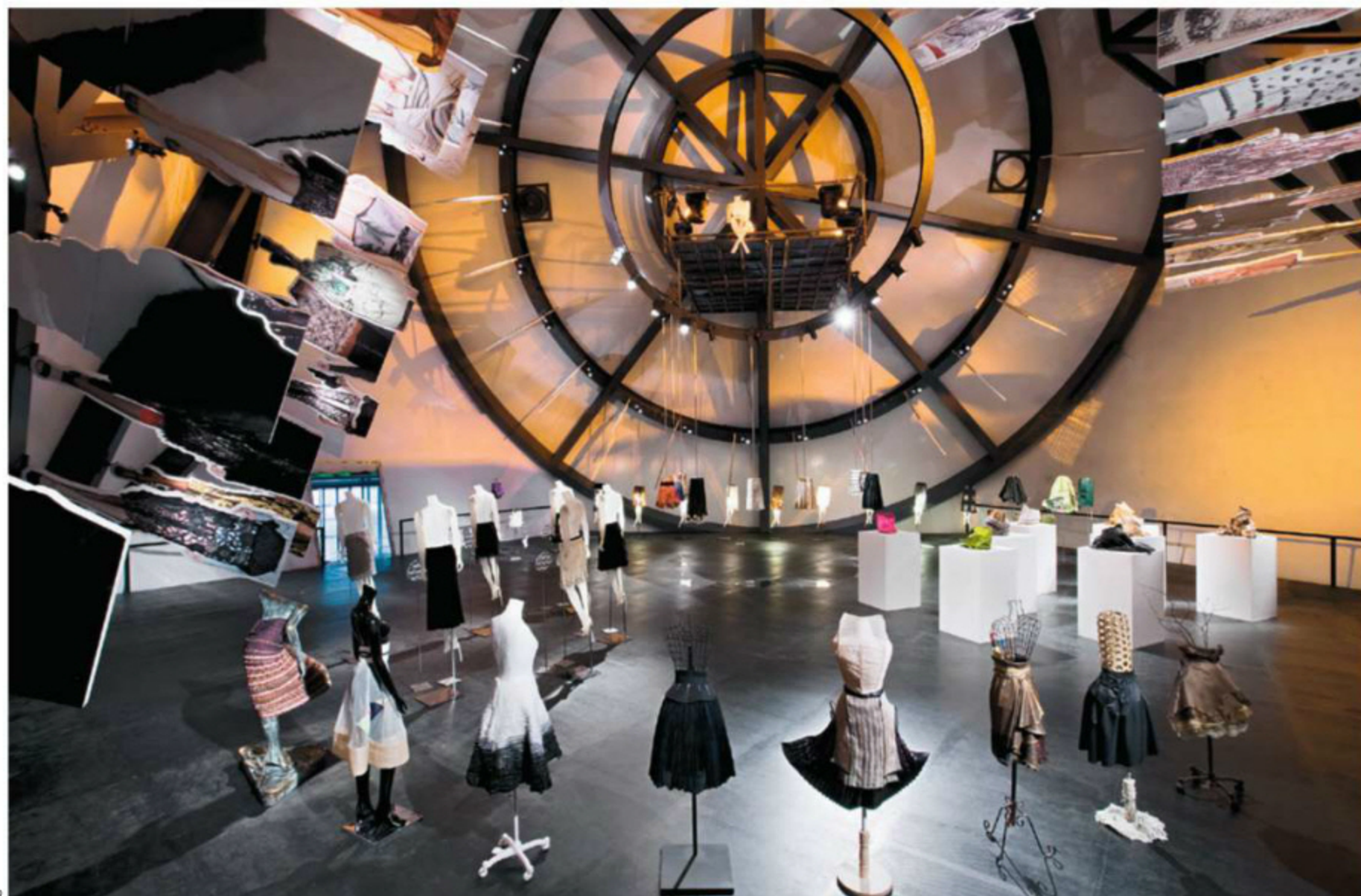
Chris van Duijn knows what he is talking about. He was involved in the planning of numerous buildings that employed materials in an experimental way or made use of materials that were newly developed specifically for the project. One example is the "Transformer", a temporary pavilion for Prada in Seoul. This geometric body has alternating sides comprised of rectangles, hexagons, circles and crosses. It consists of an interior steel frame and can be turned according to use, similar to an oversized dice cube. For the building envelope, the architects wanted a flexible and durable material that could adapt to the complex form in an optimal way. Eventually, they found what they were looking for in an industry branch unrelated to architecture, the packaging industry. Wind and water proof PVC-foil that finds use as protective material for machine components or airplanes for transport and storage received a

new function within this project. The synthetic material is sprayed onto a substrate made of strips (e.g. adhesive tape) or foil and forms a stable surface after drying that adapts perfectly to even highly complex surfaces. For use as a building envelope, the composition of the material had to be modified to achieve a translucent visual impression and the required fire proofing. Modification of materials for a new context is a common practice in the office, and the architects enjoy cooperating with small businesses and craftsmen within flexible company structures and flat hierarchies, which supports innovation. This enables direct communication and fast decision-making, as well as experimen-

tation. In the course of the decade-long cooperation with Prada, contacts particularly with Italian family businesses that create products at a very high level of craftsmanship have increased. However, there are long-time cooperations with local Dutch specialists as well, such as the workshop of Vincent de Rijk. He has been building models for OMA for the past twenty years. Specialized in plastic, he has been influential in the way the office approaches model building.

Project specific new developments: plastic foam for Prada

The by now almost legendary "Prada-foam" developed for mobile display cubes in the





6

Prada Epicenter Store in New York was initially created in de Rijk's workshop. Originating in a foam-like model building material, its transformation into real life began with a full-scale model. Initially, in order to create the intended large-size foam structure, balloons as negative were placed into form-work and cast. In countless material tests, other foam types made of plaster, metal, as well as hard and malleable types of plastic were created. The final product was something new and developed in parallel with the building design: wall panelling made of a fire-proof foam structure based on polyurethane in the company's colour, "Prada-Green". The copyrights for this development

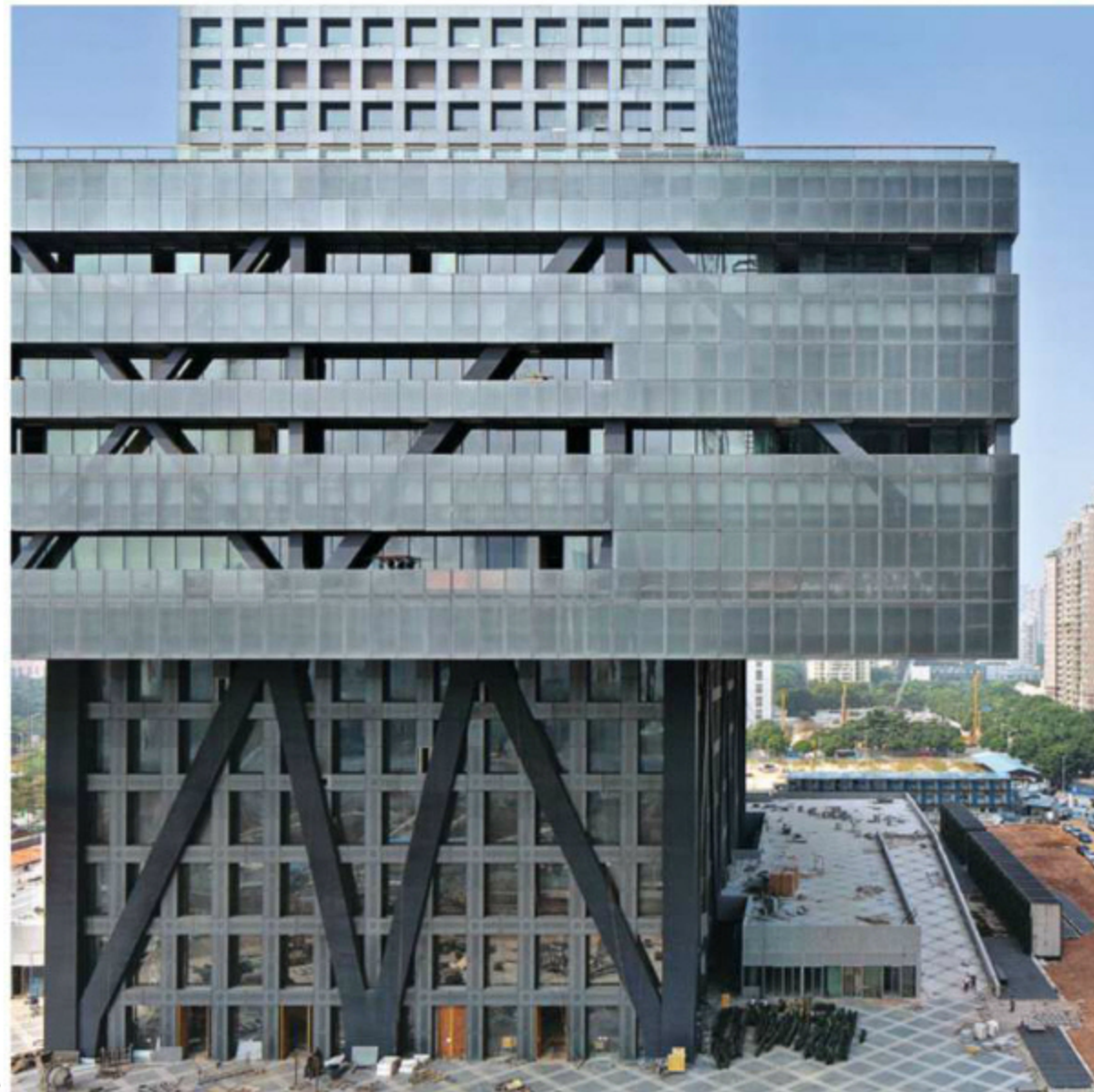
are owned to equal parts by Prada and OMA – thus, exclusiveness is guaranteed. Currently, OMA is designing the Fondazione Prada for the Italian fashion firm, an exhibition and archive building situated on a former industrial site in Milan. The development of new facade materials is in the works here as well. A number of industry partners are collaboratively developing a new product that may successively be mass produced and marketed. Research institutions are involved as well: in collaboration with the Fraunhofer Institute for Machine Tools and Forming Technology IWU in Chemnitz, Germany, OMA is currently testing aluminium foam for building applications. The materi-

- 6 Model of the Fondazione Prada in Milan (exhibited during the Architecture Biennale 2011 in the Ca' Corner della Regina in Venice)
7 Shenzhen Stock Exchange: facade detail

Christiane Sauer is an architect and material specialist. She heads "Formade", an office for architecture and material situated in Berlin. Until 2001 she worked for international offices such as OMA, David Chipperfield Architects or FACE Design NYC. Since 2013 Christiane Sauer is Professor for Textile and Surface Design at the Kunsthochschule Weissenhof in Berlin.

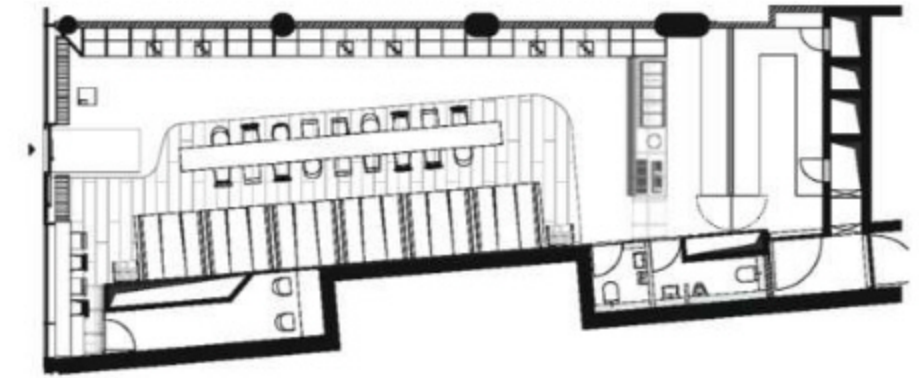
al's advantage is that its stable structure meets load-bearing requirements. At the same time, its surface appears visually fascinating. In the Fondazione Prada, the aluminium foam will serve as stiff cladding for the load-bearing structure and at the same time provide a finished wall surface facing the interiors.

Tried and trusted, in a new context: the facade of the Shenzhen Stock Exchange
New technological developments aren't always necessary to achieve a new material aesthetic. Completed in the Summer of 2013 the 256 meter tall Shenzhen Stock Exchange building is comprised of an equally simple as well as memorable geometry: a rectangular tower on top of a pedestal. However, other than conventional skyscraper typologies, this pedestal is elevated by 36 meters and forms a column-free platform cantilevered from the tower. OMA juxtaposes this simplicity of form with a subtle play of facade surfaces. From afar, the platform facade appears solid, grey, almost like lead. This emphasizes the clear form and compact impression of the building. Yet, at a closer glance, it reveals its shimmering, even partially translucent envelope. The steel structure was clad in glazing with reflective coating and grey surface print. It provides the column grid with an unexpected degree of depth and reflects light both within the interior as well as along the exterior, reminiscent of crystal. In this context, the classic construction material glass provides an unusual impression that oscillates between solidity and lightness. This example shows how the way OMA selects materials is always closely related to the overall concept of the building – yet not as a simple repetition of an idea, instead within a process that equals a dialogue. The element of chance or the "organized chaos" not only plays an important role in the way the office works. It can also be recognized within the wonderfully surprising moments created by the completed buildings that allow for discontinuities and provoke contradictions, and thus, create their very own identity.



7

"The Material always serves the Idea" – an Interview with Peter Ippolito



1

DETAIL: Your office is multidisciplinary. Do you, as result, deal with materials differently than an architectural office?

Ippolito: We always try to go beyond disciplinary borders, regardless whether the project already follows a comprehensive approach or not. We principally develop our projects from the perspective of the user. Since we are always very close to their perception, we are also very close to their concept of materiality. Within the design process, we establish actual choreographies of what can be seen, smelt, or touched.

How is research on materials organized in the Ippolito fleitz group?

Ippolito: One staff member is exclusively responsible for our sample library and for "material scouting." This takes place on three levels. At first, we further develop what is known to us, the classic approach. In addition, we collect precise information on everything that we become aware of in our everyday work or in publications. The most important level, however, is the project-specific search, when we have to make particular decisions within the project. By integrating material scouting we are less tempted to simply pick something from our sample treasure chest, so to speak. Instead, sometimes we use things provocatively. They may not seem to really fit at first glance, yet

1, 2 WakuWaku Dammtor, Hamburg 2012

lead us towards a surprising material selection. Materials can make a project unique, even if we don't aspire to always be as original as possible. Sometimes we develop a very loud, in other cases a rather subtle material language. Using the same repertoire all the time would be boring.

Detail: Can materials also define the concept as such?

Ippolito: It is actually the other way round – the concept of a project defines the materials. At first, we develop a clear idea that defines everything else in follow. As an exception to the rule, we are currently working on a table collection made of ceramics. In



2



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this case, the material happened to be the point of origin.

Are there applications that make it hard to find good products?

Ippolito: That has never been a handicap for us. In the case of interiors, we tend to develop our own products. Different than the typical architect, we hardly select standard products. For instance, we often specify custom-made parquet flooring, so we can precisely achieve the tone or grain we are looking for. The material environment of interiors tends to be different than that of facades or the surrounding. First and foremost, there are no limitations, with the ex-



4

ception of the client's budget. We nowadays have the capacity to produce numerous items in small series. 3D milling, digital printing and digital casting, 3d print – there are so many possibilities. One question is absolutely central: which product is the right one for the idea?

Don't custom solutions automatically lead to very high costs?

Ippolito: We always try to achieve the greatest design impression within the budget. Even if many of our projects seem expensive, they don't need to be in terms of the budget. In the early days of the office, we tried hard to achieve something on a small



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budget that didn't resemble that particular fact, but instead a strong idea.

What is the relevance of searching for so-called "new" materials?

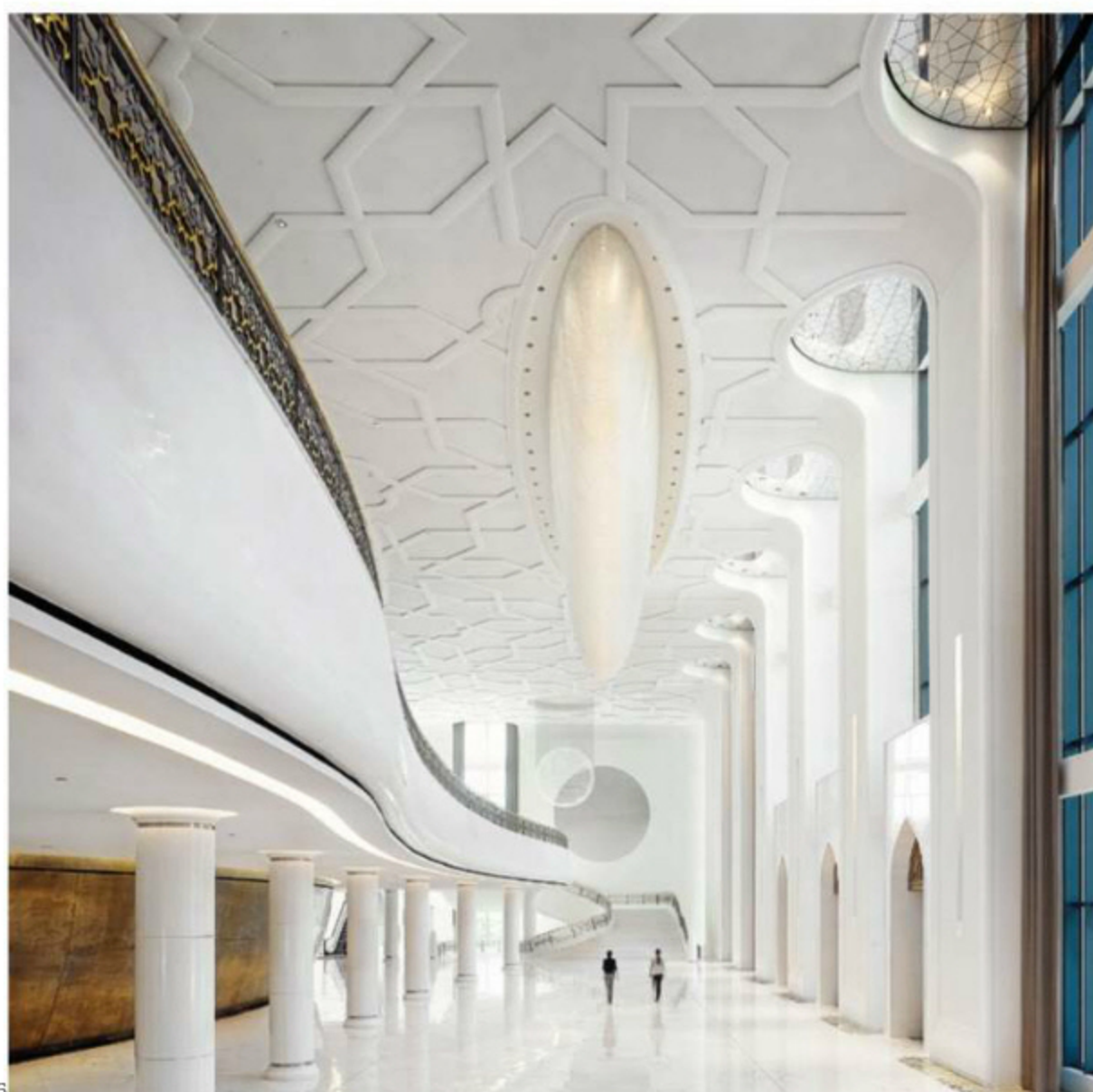
Ippolito: We certainly don't try to ignore innovation. However, the value of the "new" as such isn't what we focus on. The goal is always the impression on the user – everything has to serve that end. At the same time, it satisfies one's own curiosity to test new materials with new qualities that expand the horizon. However, that isn't an end in itself. The idea that newer and crazier materials lead to a better product doesn't apply to our work.

In which cases is it worthwhile to think outside of the box?

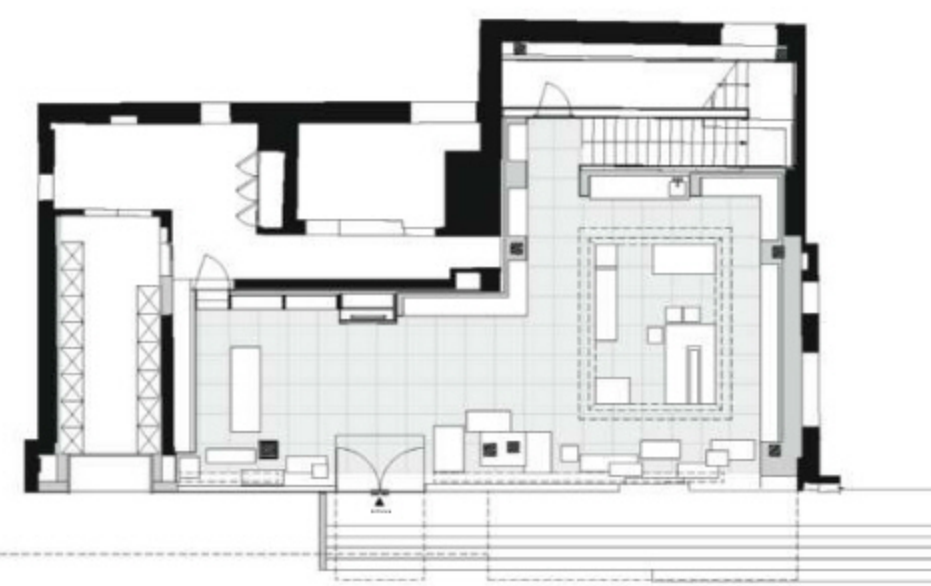
Ippolito: At this point? Technical textile. Filter technology and related materials that have already begun to appear in architectural applications are something that we currently collect in a more focused manner. Some manufacturers are actively marketing their products in the architectural field. This is something we try to keep an eye on. We also collaborate with textile designers in order to be up to date.

Aside from sensual aspects, do technical criteria also influence the material selection?

Ippolito: Even if a strong idea is the most important thing, some projects require that whatever you intend to express should serve particular functional or technological requirements. In the case of the staff restaurant for "Spiegel" in Hamburg we worked with Pantoni's legacy. The theme of a moment as catalyst of identity was very important. However, we had to meet very strong acoustic requirements for the space, since it had sound-reflective surfaces on five sides. This is why we introduced a highly functional ceiling capable of compensating this and offering a high degree of flexibility in using the space while including lighting and electro-acoustic equipment. The building also received the Gold Environmental Certificate of the HafenCity Hamburg. All materials had to meet strict code requirements.



6



7

Is the sustainability of materials also important within other projects?

Ippolito: Nowadays, this always plays a role and becomes particularly important in some projects. One of our clients is the WakuWaku restaurant chain in Hamburg. They follow a comprehensive sustainability concept beginning from the menu via the architecture to the energy concept for the kitchen. In this case, products must be sustainable. This is also an element of the brand message.

In the most recent branch restaurant, we employed post-consumer wood that conveys a very intense, tangible spatial feeling.

At which point do you include professional consultants in the material selection process?

Ippolito: Our preliminary selection already reflects how a certain material is supposed to perform in visual as well as functional terms. Particularly acoustics and light determine individual well-being to such an extent that we simply can't ignore them. During the successive fine-tuning with our consultants we typically try to reach a point where acoustics and light become a natural, self-evident element of the space. People are supposed to see the light and not the lighting and experience a high acoustic quality of space without us having to include acoustic paneling.



8

- 3–5 compilation of material samples
- 6 Palace of International Forums "Uzbekistan", Tashkent 2009
- 7, 8 Bork flagship store, Moscow 2011

Could you have realized some of your projects with completely different materials?

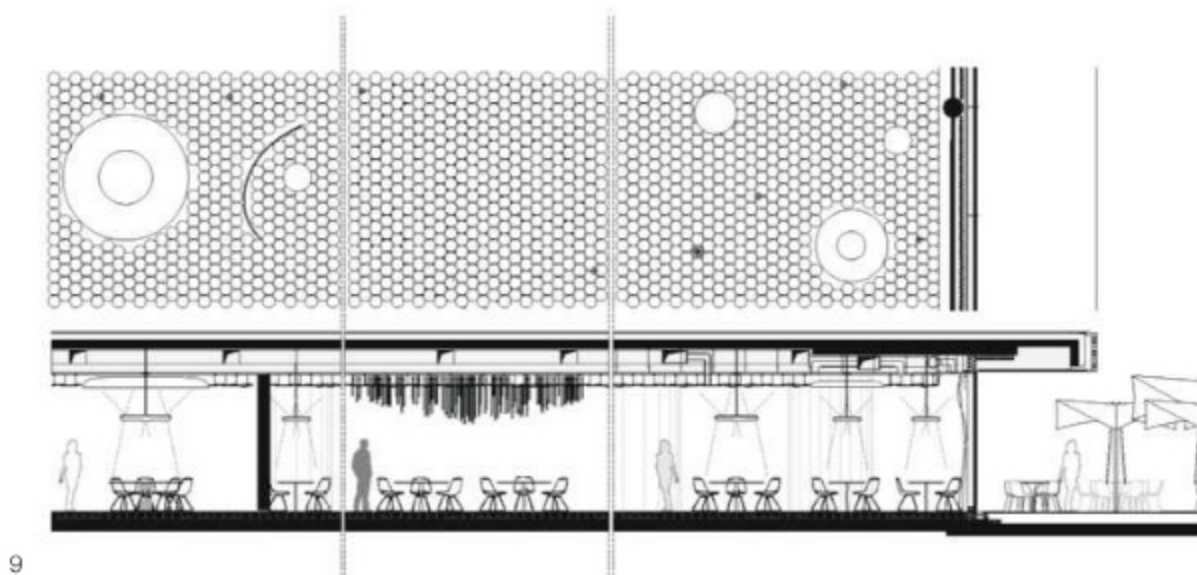
Ippolito: It's actually typical for us to try out materials and experiment in different directions. Identifying the best possible expression in collaboration with the client is quite often a uniquely intense process – particularly in commercial projects. Things aren't always obvious. If you envision a very specific solution, it certainly has to be exactly one particular material. We tend to be very open-minded within the design process and offer our clients more than one solution. We are currently designing a large retail store in Moscow. For this project, we compiled six different material variations. They are all great and I would be happy to realize all of them.

Which project was the greatest challenge for the office so far?

Ippolito: The Palace of International Forums in Uzbekistan. We had to complete it in very little time – designing, planning, building a 40,000 square meter structure in five and a half months. We were confronted with a culture we were previously unfamiliar with. We were suddenly immersed within a high quality material environment that rather likely wouldn't have been our first choice. The question of accessibility, manufacture, and finish of materials led to a multi-layered decision making complex. We created huge surfaces of decorative metal panels covering 2000 square meters – something that had never been done before, even surfaces made of mother-of-pearl.

Which materials do you enjoy using and which would you prefer to avoid?

Ippolito: I love mirrors a lot. That has a lot to do with our line of work – identity architecture. Identity is always related to the perception of others and to self-reflection. Reflective surfaces can be considered the built equivalent of this statement. In addition, they offer fantastic opportunities for expanding space and establishing complexity. Beech wood on the other hand, something we grew up with when we were students, is some-



9–10 "Spiegel" staff restaurant, Hamburg 2011



thing we simply don't want to see anymore. However, that doesn't mean that we may not develop a burning desire for beech wood once more, maybe ten years from now.

Does that mean that material selection is also influenced by trends?

Ippolito: Of course, we always depict certain desires within material environments. Architecture always reflects society, while being a protagonist as well. Whether playing with gold or marble for the luxury class or, on the other hand, the topic of "vintage"-materials – in a certain sense, the task is to create places within a world of continuous acceleration.

Even if the vintage style rather plays with authenticity, instead of actually being authentic?

Ippolito: It indicates the desire of society for place, history and tradition. While we are strongly engaged in digitization and visualization, there is also a desire for tangible experience and recognizing things, regardless whether the memory is individual or collective.

Is permanence of a design concept also important to your work?

Ippolito: A good project is a good project, and it will always remain a good project. In this regard, Verner Panton created one of the best examples. My first project from 25 years ago, when I still was a student, was a doctor's office. At the time I was asked whether people would still want to see it three years later. Today, the office still looks the same. It is very successful and people still like going there. Certainly, I would design it differently today. If something is well designed, it is capable of enduring. The approach of always working in a minimalist fashion is something I reject.

ippolito fleitz is a multi-disciplinary, internationally active design studio located in stuttgart. The studio expertise includes architecture, interior architecture, visual communication and product design. The interview was held by Andreas Gabriel in Stuttgart.

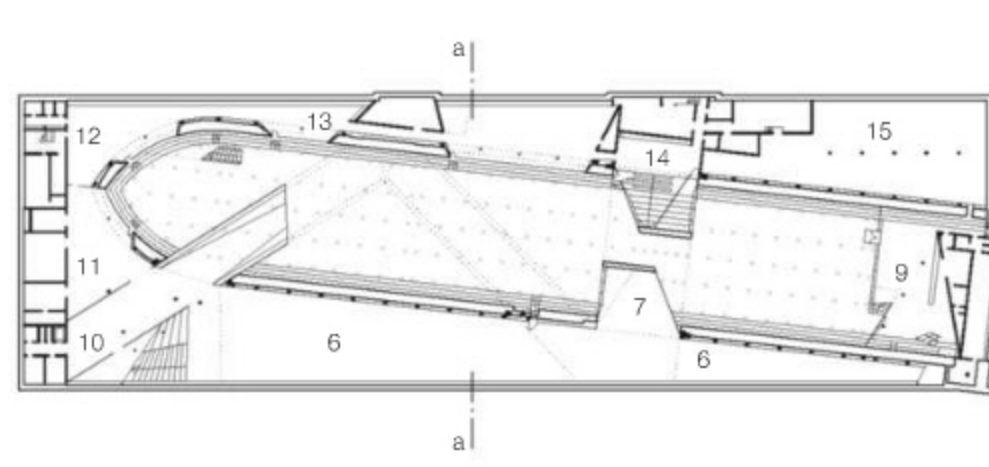
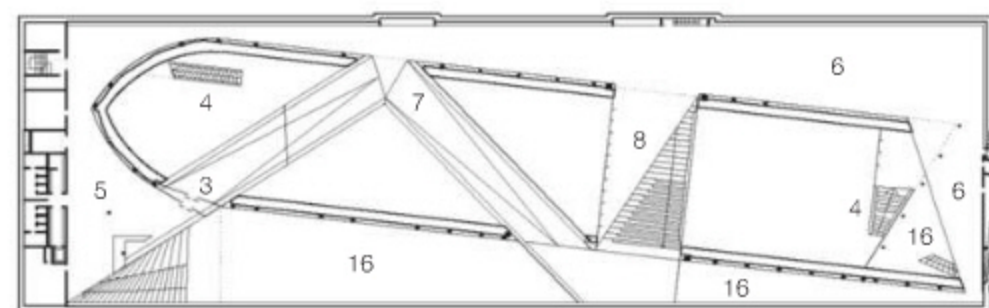
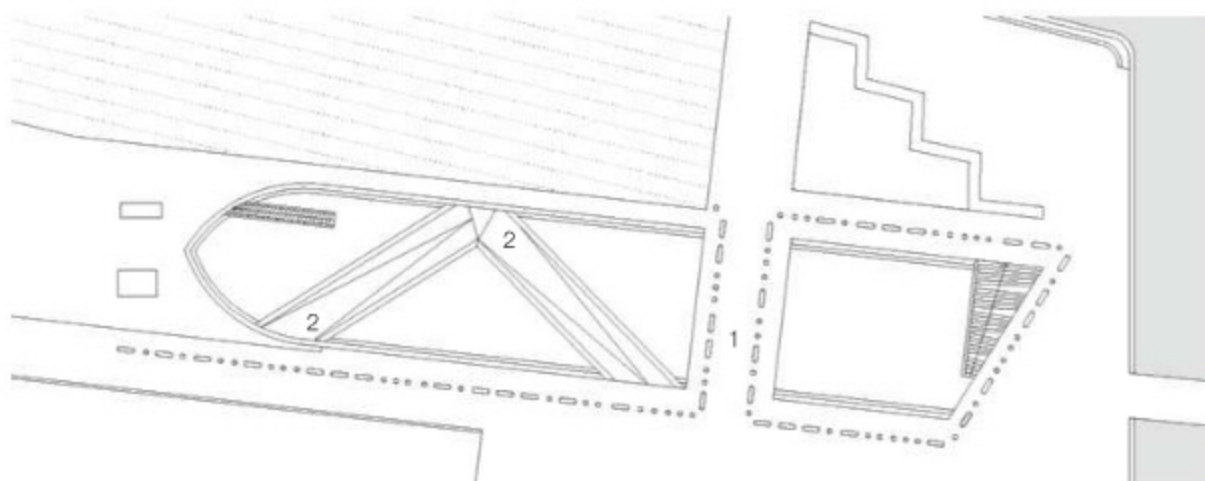


Ramps Instead of Planks – The Danish Maritime Museum by BIG

Frank Kaltenbach

Architects: BIG – Bjarke Ingels Group, Copenhagen
Structural engineers: Rambøll Denmark, Copenhagen
Exhibition design: Kossmann.dejong, Amsterdam

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Floor plans
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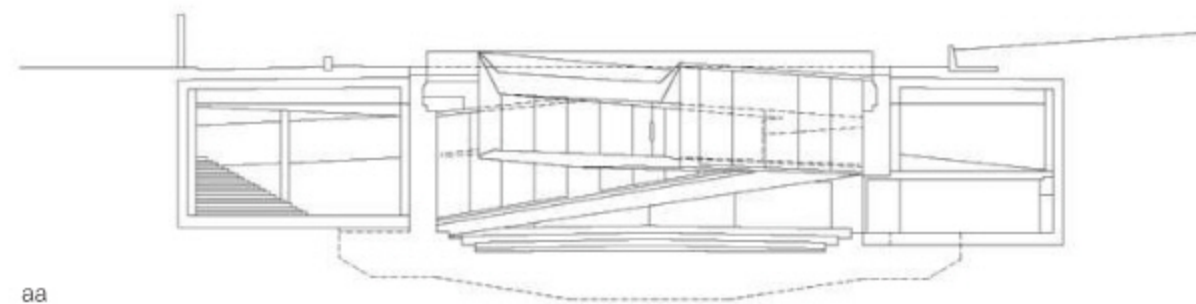
- | | | |
|----------------------------------|-------------------------|--------------------------|
| 1 Road bridge to Kronborg Castle | 6 Permanent exhibition | 11 Seminar space |
| 2 Access ramp | 7 Temporary exhibitions | 12 Administration |
| 3 Museum entrance | 8 Auditorium | 13 Rest room |
| 4 Escape stairs | 9 Cafe | 14 Children's auditorium |
| 5 Foyer | 10 Multipurpose space | 15 Servicing, workshop |
| | | 16 Void |

Where should one relocate a museum that has to be moved out of the rooms of the former royal residence of Denmark? In 2000, Kronborg Castle was to be placed on the UNESCO list of World Heritage Sites on condition that the maritime museum housed within it since 1915 be removed and the rooms restored to their historical form. The new Danish Maritime Museum in Elsinore, a good hour's drive north of Copenhagen, is a stroke of luck for the harbour town. The structure is spectacular, yet scarcely visible, not even at close quarters. The 3,500 m² exhibition area is concealed beneath the peripheral harbour promenade, leaving the view of the castle unobstructed. Only when one stands immediately in front of the outer castle gate does a closely spaced row of stone bollards draw attention to the glass balustrades around the open atrium of the "new development" – a former dry dock 150 m long and 25 m wide. Here, the ground opens up, and the base slabs of a glazed bridge structure zigzag diagonally down from one side of the quay to the other. On this ramp at the heart of the museum, an auditorium has been created that is so transparent that one has the impression of sitting virtually in the open air. From 1953, ships had been able to sail into the dock directly from the harbour basin, but entry was later closed off and the water pumped out, so that the vessel finally lying there was held within tight concrete confines. A number of dry docks of this kind are used today as museums and house famous ships from the history of seafaring. In Stockholm, the "Vasa", a 17th-century warship that sank on her maiden voyage, is visited by 1.2 million people a year and is one of the biggest tourist attractions of its kind. In London, it is the restored "Cutty Sark", one of the fastest windjammers of the 19th century, rising from a glass-covered dock.

No such flagship is on display in the Danish Maritime Museum in Elsinore, and that is what makes this institution unique. Here, the story of navigation is told through the architecture itself – the rise and fall of the waves, the expanse of the ocean and the tight con-

Section scale 1:500
Site plan scale 1:12,500

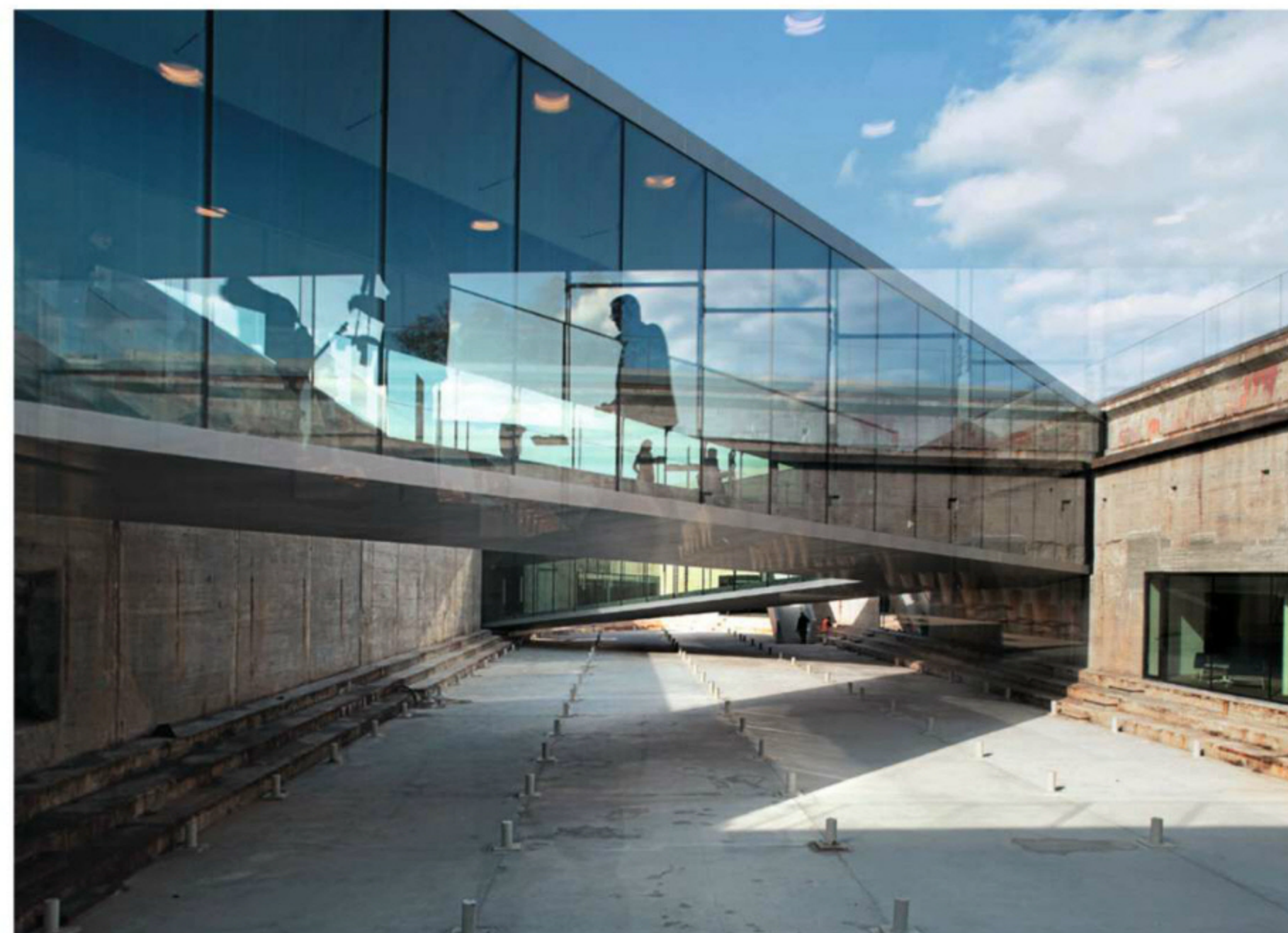
a Danish Maritime Museum
b Kronborg Castle



aa

ditions in the hull of a submarine. Even the staircases are steep, as on a seagoing craft, and the steel base plates are suspended from the underside of the concrete bridges by means of rusty ships' chains. The building site was an impressive spectacle in its own right: for months, the dock lay like a concrete ship's hull within the excavations. To prevent the whole structure floating up like a nautical vessel, the base slab was anchored in the bed of the sea by hundreds of 40-metre-long steel cables. Bjarke Ingels, the architect, relativizes these maritime im-

ages of the construction with a more abstract, minimal architectural formulation, however: "The position of the bridge in relation to the castle was predetermined. We had to create a route free of barriers to allow visitors to reach the entrance a storey lower. The zigzag form of the ramp was, therefore, a logical outcome." Even if only one visitor in three to the famous Louisiana Museum of Modern Art in Humlebæk continues on another ten minutes to reach Elsinore, the ramp there still has to bear some 500,000 guests a year.





Auguste Perret: Eight Masterpieces!/? Reinforced Concrete Buildings

Auguste Perret (1874–1954) is one of the great pioneers of reinforced concrete construction. By creating a synthesis of the classical orders and modern construction techniques, the French architect and contractor played a major role in defining a specific aesthetic for the building material. The Parisian exhibition focuses on eight important projects; the stated goal is to shed light on the creative process in which the works came into being. The Palais d'Iéna, the exhibition venue, is itself one of the "eight masterpieces" – and, accordingly, the largest item on display. As scholarly curator, Joseph Abram, an expert on Perret, was responsible for the show's theoretical and historical content. Prada, a sponsor of the exhibition, suggested Rem Koolhaas as artistic curator. Beginning in 2011, Koolhaas's AMO/OMA developed the scenography for a variety of Prada events in the Hypostyle Hall at Palais d'Iéna. And in that very space the exhibition design now collages aspects of these events, for example, an illuminated metal lattice cage along the long side of the hall and the catwalk in wood at centre, flanked by matching seating steps.

Until 19 February 2014, Palais d'Iéna, Paris
www.expositionperret.fr

Sensing Spaces: Architecture Reimagined

Seven site-specific installations at the Royal Academy of Arts by Grafton Architects, Diébédo Francis Kéré, Kengo Kuma, Li Xiaodong, Pezo von Ellrichshausen, Eduardo Souto de Moura and Álvaro Siza. 25 January to 6 April 2014, Royal Academy of Arts, London, www.royalacademy.org.uk

Reactivate! Innovators in Dutch Architecture

First shown in Maastricht in 2013 – now with additional Scottish projects in Glasgow. Until 5 February 2014, The Lighthouse, Glasgow, www.thelighthouse.co.uk

Now Babylon Architecture, Culture and Identity

Focusing on the Arab world, from the Arabian Peninsula through Lebanon to Morocco. 31 January to 4 May 2014, Louisiana Museum of Modern Art, Humlebæk, Denmark, www.louisiana.dk

52 Weeks, 52 Cities Photographs by Iwan Baan

Until 16 February 2014, Marta, Herford, Germany, www.marta-herford.de



Material Revolution 2: New Sustainable and Multi-Purpose Materials for Design and Architecture

Sascha Peters, Birkhäuser, Basel 2013, 220 pp., hardcover, ISBN 978-3-03821-476-2, US\$84; £55; €59.95

This second volume of *Material Revolution* addresses the rapid development of material research and presents materials new to the market since 2010. Keeping a similar system of classification it covers a different range of materials. There is a chapter dedicated solely to the criteria and factors of sustainable product design, as well as one introducing innovative projects.

Materials for Design 2

Victoria Ballard Bell, Patrick Rand, Princeton Architectural Press, New York 2014, 272 pp., paperback, ISBN 978-1616891909, US\$50; £30; €37.50

Seven years after the first *Materials for Design*, the second volume presents sixty new case studies, including projects by Ryue Nishizawa (SANAA), LOT-EK, Studio Gang and Weiss/Mannfredi. The book is divided into six sections: glass, concrete, wood, metal, plastic and – new in Volume 2 – stone.

Flexible Composite Materials in Architecture, Construction and Interiors

René Motro (ed.), Birkhäuser, Basel 2013, 240 pp., hardcover, ISBN 978-3-0346-1350-7, US\$70; £50; €49.95

This book presents technical textiles in three sections, introducing materials together with their specific properties; dealing with uses in the areas of architecture, textile facades, solar protection, and interior design, with special attention to finishing techniques and construction principles; and illustrating various fields of application with a selection of some twenty-five international built projects.

Sustainable Materials, Processes and Production

Rob Thompson, Thames & Hudson, London 2013, 224 pp., paperback, ISBN 978-0500290712, US\$29.95; £16.95; €19.80

This book analyses materials, manufacturing processes and production lifecycles, featuring practical information, technical descriptions, notes on suitability, efficiency, cost-effectiveness and environmental impact as well as illustrated, step-by-step case studies of products, components or materials.



Landscape for Living in Weißenbach

Architects:

AL1 ArchitektInnen, bauchplan, grundstein,
Peter Kneidinger, Munich/Vienna

Team:

Tobias Baldauf, Peter Kneidinger,
Marie-Theres Okressek, Nicole Heiss,
Irene Prieler, Michael Wildmann, Josef Rott

Structural engineer:

Peter Kneidinger, Vienna

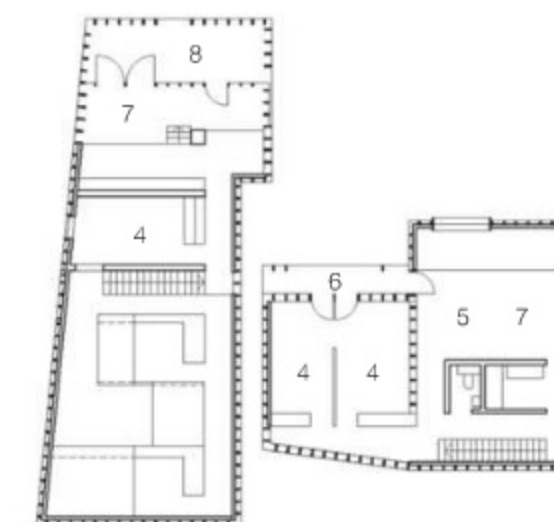
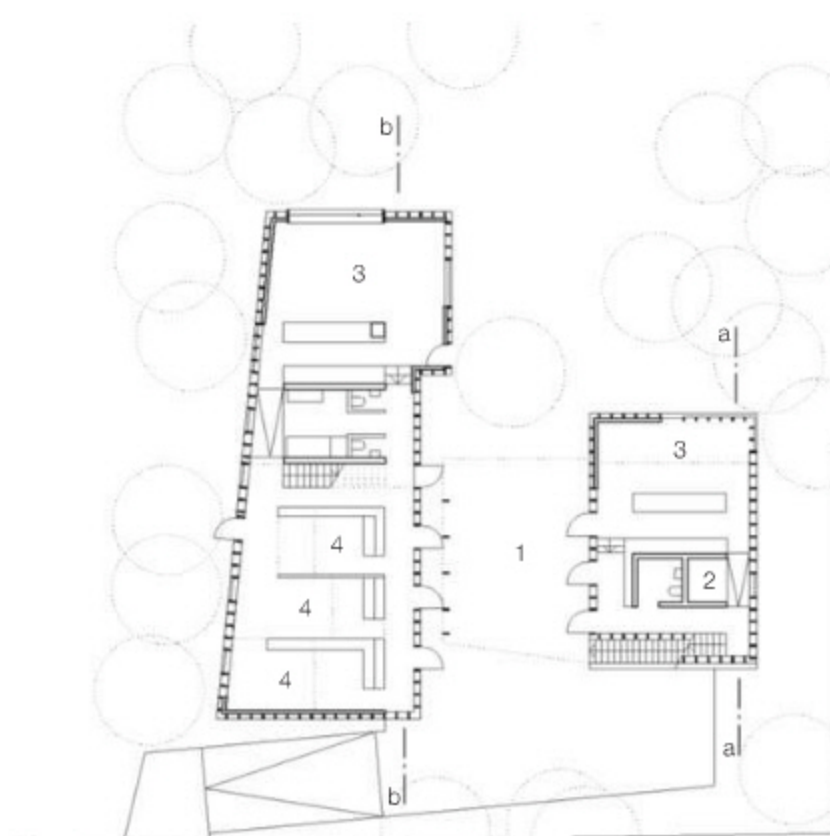
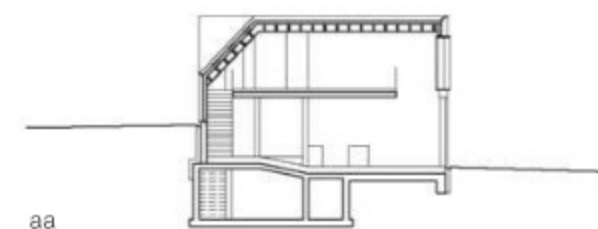
Others involved in the project: see page 108



Site plan
scale 1:2000

Sections • Layout plans
scale 1:400

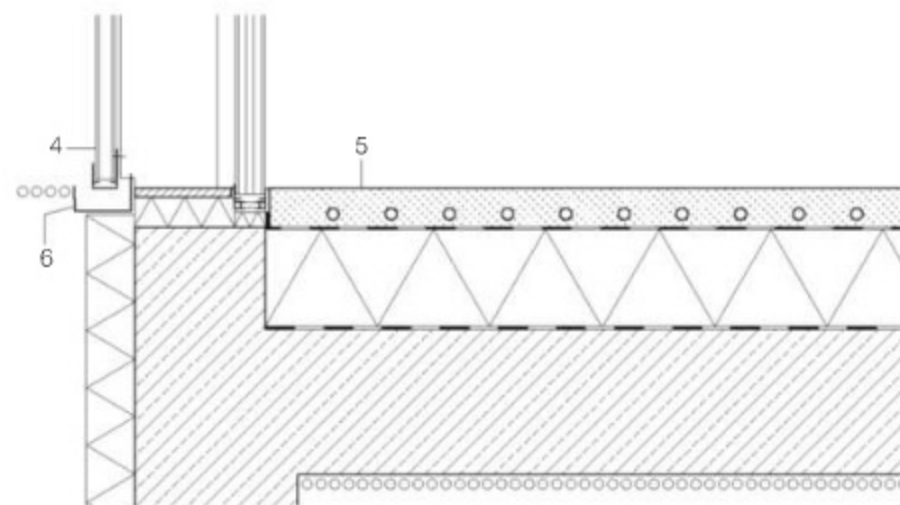
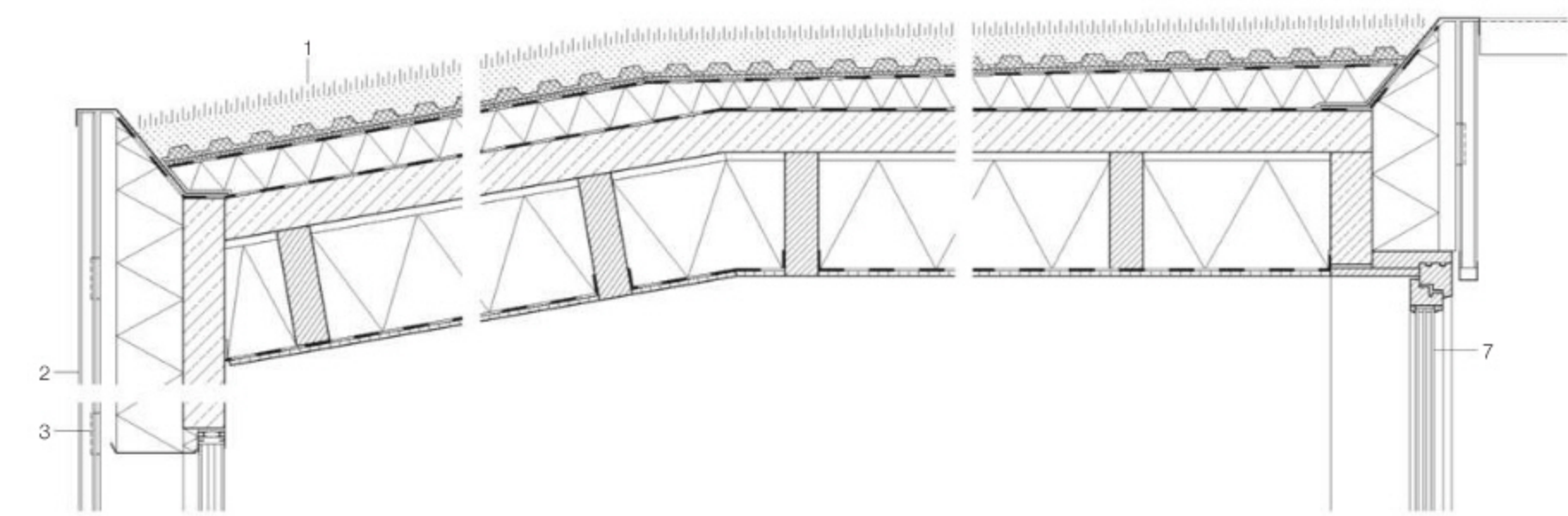
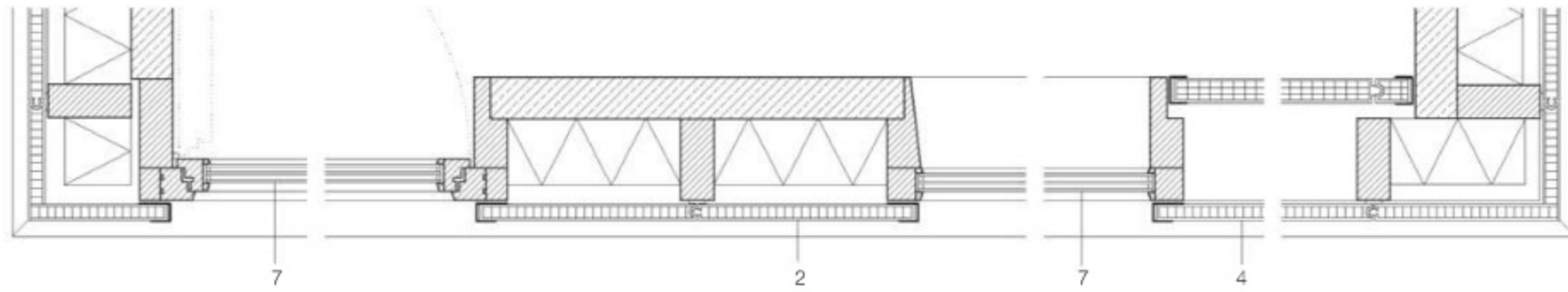
- 1 Covered courtyard
- 2 Pantry
- 3 Cooking/Living
- 4 Children
- 5 Gallery
- 6 Balcony
- 7 Sleeping
- 8 Roof terrace



An out-of-the-ordinary residential ensemble enhances the built environment in Weißenbach, a town located less than 20 km south-west of Vienna. The clients, who were part of the interdisciplinary design team, were keenly alert to the existing conditions and counterposed the ubiquitous, run-of-the-mill homes with an open, ecologically minded form of dwelling. The team situated two L-shaped structures on a site with mature trees; in combination with the outdoor spaces – open courtyard, covered courtyard, roof terrace, green roof and garden – they create a versatile landscape for living. The floor plans defy established conventions taking as point of departure propositions

such as “a child doesn’t need his or her own room at every age”, “bathrooms can have more than one door” and “light is the greatest good”, they designed the two levels, which – aside from the load-bearing sanitary core – rely only on freestanding closets to separate spaces. Their desire to build resourcefully led them to concrete-timber composite construction, which manifests itself in the ceilings, walls and rows of columns. Preference was given to locally sourced construction materials such as timber from the Vienna Woods, hemp insulation acquired in nearby Czech Republic, and the loam excavated on site. The clients themselves worked the latter, compacting it from

12 to 8 centimetres; the indoor climate benefits from this rammed-earth construction technique. Its animated texture contrasts strikingly with the facade, which is made of polycarbonate boards. The latter were positioned either as inner shell in combination with the exposed concrete walls or paired with another multi-wall polycarbonate sheet. Its U-value of 0.8 W/m²K easily meets requirements for low-energy certification. But its real strength becomes apparent in the overall atmosphere: the translucent areas make nature, weather and the seasons perceptible from inside the home. Moreover, the boards’ shimmering surface gives the ensemble its distinctive appearance.



Horizontal section
Vertical section
scale 1:20

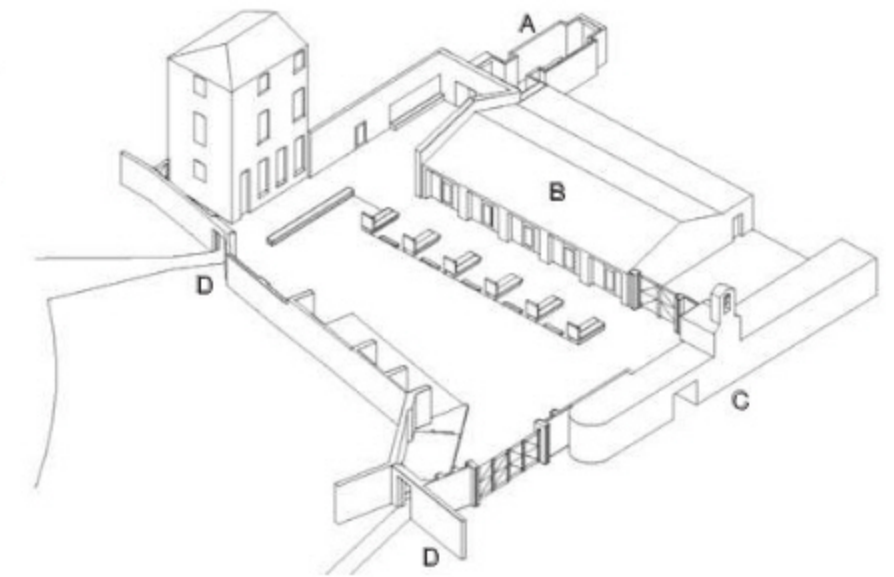
- 1 roof construction:
80–100 mm light substrate with
extensive vegetation
30 mm moisture-retention mat
10 mm drainage mat
root-proof membrane
60–100 mm extruded rigid-foam
thermal insulation
bituminous sheeting as
back-up measure
100 mm reinforced concrete
80/280 mm rafters
260 mm hemp thermal insulation
vapour retarder
12 mm oriented-strand board
- 2 wall construction:
40 mm twin-wall
polycarbonate sheet
40 mm ventilated cavity
160 mm thermal insulation
100 mm exposed concrete
- 3 fastener: purlin clip
- 4 wall construction:
40 mm twin-wall polycarbonate sheet
80/200 mm timber posts/
200 mm cavity
60 mm multi-wall polycarbonate sheet
- 5 floor construction:
80 mm rammed earth with
underfloor heating
separating layer
200 mm rigid-foam thermal insulation
sealing layer
300 mm reinforced-concrete slab
- 6 stainless-steel gutter, on all sides
- 7 triple glazing: 4 mm toughened glass +
16 mm argon-filled cavity + 4 mm
toughened glass + 16 mm argon-filled
cavity + 4 mm toughened glass,
low-e coating, in wood frame

Courtyard Design in London

Architects:
Henley Halebrown Rorrison, London
Team:
Noel Cash (project architect)
Structural engineer:
Techniker, London
Others involved in the project: see page 108



Axonometric drawing
(looking north west)
A Passageway through
existing building
B Café
C Chapel
D Access to landscape
garden



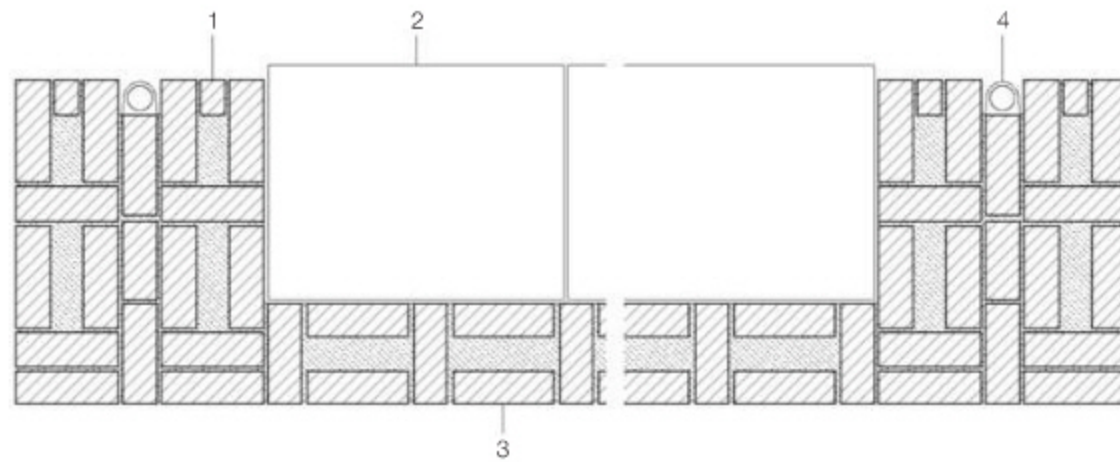
The Yard – as the architects call this space – is the first component of the master plan by HHR to be realised for the campus at the University of Roehampton in southwest London. The former trades yard and workshops – which were previously inaccessible to students – have been transformed into a space that is visually connected to the student café and the university chapel. In addition, a new passageway was created through the faculty building to the north. At the courtyard's southern edge, 2 additional openings in the wall lead to a landscaped garden belonging to the university. The aim was to employ materials that would unify the perimeter walls – which came into view when the workshops

were demolished – and the courtyard. The brick the architects selected measures 210 x 48 x 70 mm, smaller than the standard format, and has a water-struck surface. Brick serves as the building material for load-bearing wall segments, as well as for the non-structural cladding and the courtyard paving. Only two materials other than brick are visible: the precast concrete, toned with silver-grey granite aggregate, used in the benches and copings; and the Douglas fir – painted, correspondingly, silver-grey – in the gates to the courtyard and the entrance to the café. Upon closer inspection it is possible to discern between load-bearing and non-load-bearing brick walls: the former

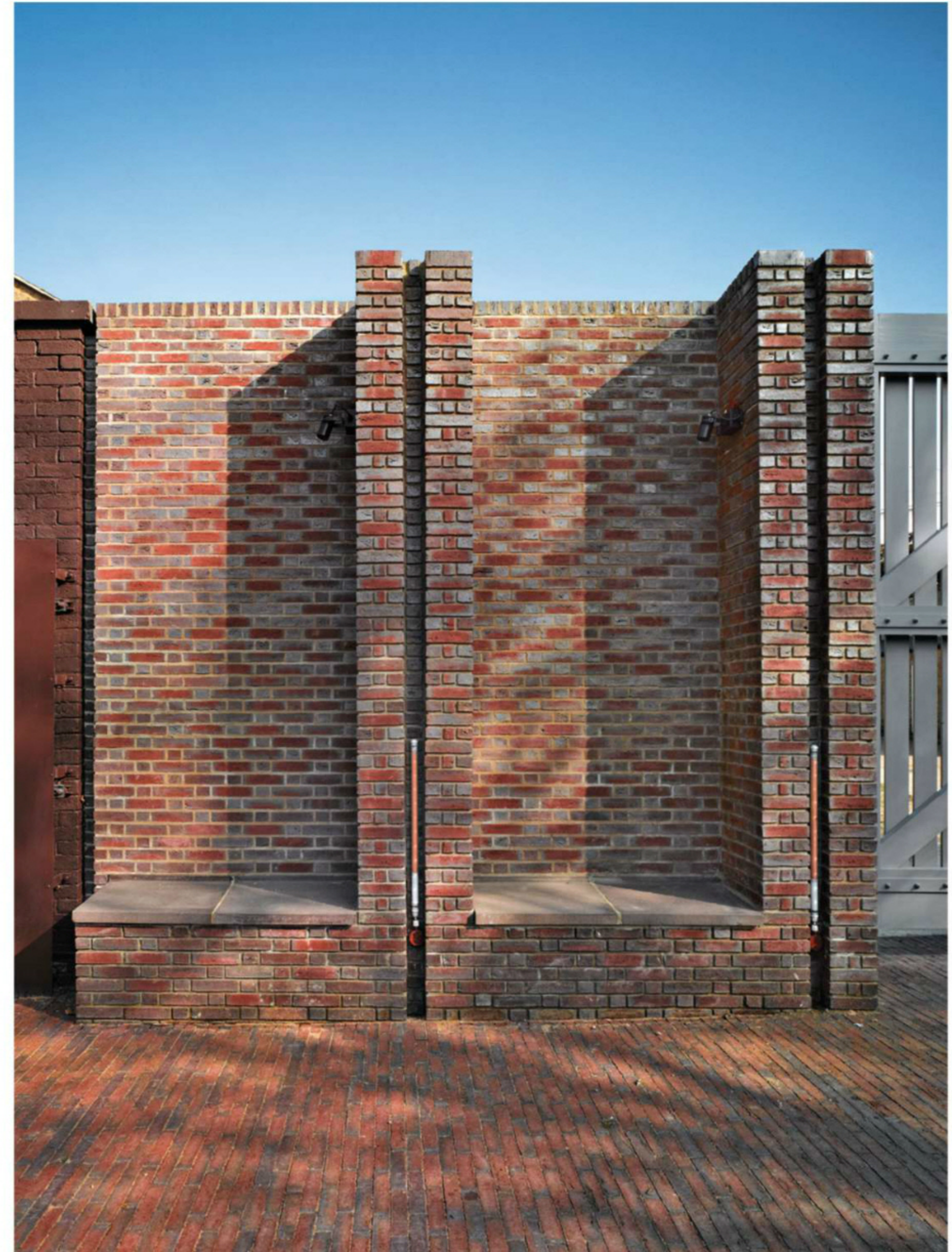
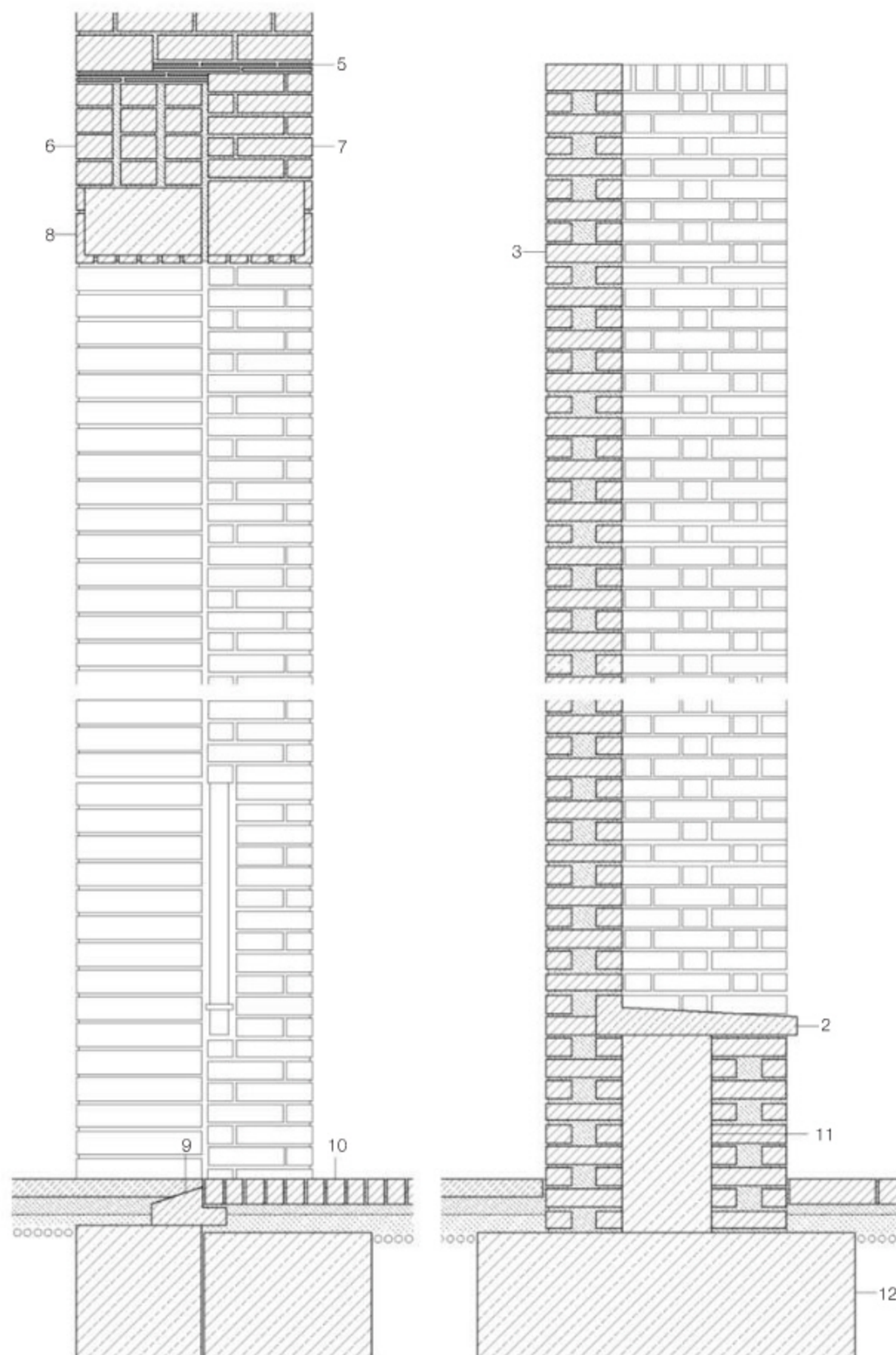
were laid in Flemish bond, the latter in running bond. The only use of reinforced concrete – in the form of precast units faced with brick – was in the flat arches spanning the openings. The Yard's animated aesthetics are attributable, above all, to the variety of colours in the bricks: these range from grey to orange-brown and purple. While the mortar joints in the load-bearing walls are recessed, in the backrests of the benches they are flush with the bricks' outward-facing surface. The width of the joints (12 mm) was selected so that 5 layers of the new brick correspond to 4 layers of the existing brick masonry. Because lime mortar was specified, no expansion joints were needed.



Horizontal section
Boundary wall with benches
Vertical sections
Courtyard gate • Boundary wall with benches
scale 1:20



- 1 510 mm exposed solid brick masonry, water-struck surface (brick format: 210/48/70 mm)
- 2 560/50–110 mm precast-concrete seat
- 3 210 mm exposed brick masonry, water-struck surface
- 4 lighting: T5-fluorescent lamp, polycarbonate casing (IP 64 safety classification)
- 5 slate slabs as moisture protection (between existing masonry and new masonry)
- 6 brick masonry (existing), partially augmented with salvaged bricks
- 7 282 mm exposed solid brick masonry (new) secured to existing wall with stainless-steel anchor
- 8 325/185 mm reinforced-concrete lintel
- 9 25 mm brick facing
- 10 concrete abutment
- 11 70 mm water-struck brick paving
- 12 30 mm recycled glass granules gravel, coarse, partially to falls (varying height)
- 13 250/550 mm reinforced-concrete base
- 14 1050/500 mm reinforced-concrete foundation



Performing Arts Centre in Karlsruhe

Architects:

Architekten. 3P, Stuttgart

Gerhard Feuerstein, Arne Rüdener

Team:

Christina Maier, Mentor Halili

(project architect)

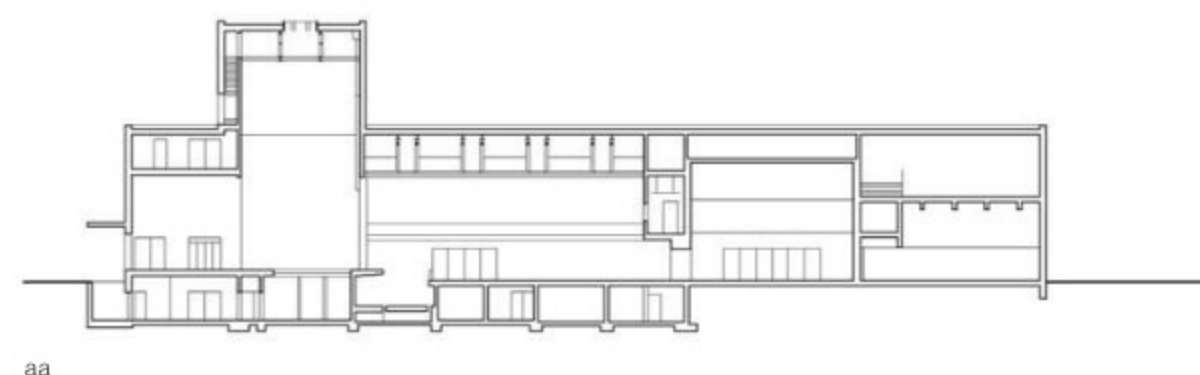
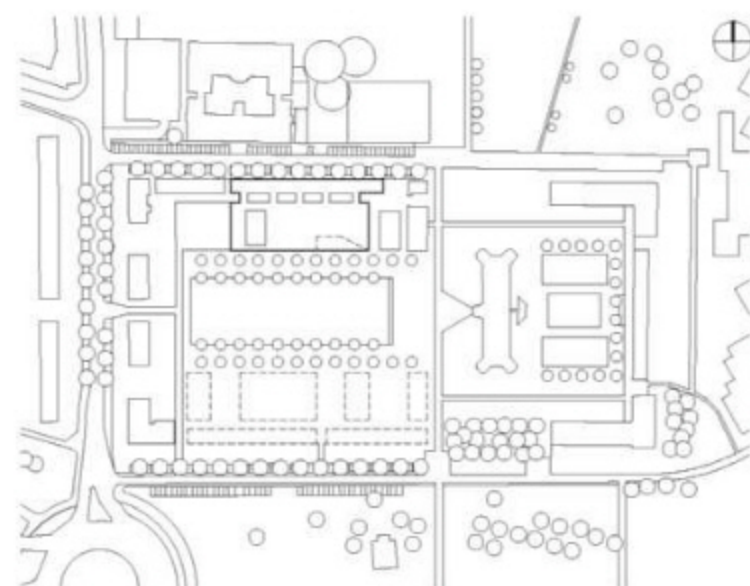
Miriam Baehrens, Felix Wilhelm, Eugenio

Bisignani

Structural engineer:

Pfefferkorn & Partner, Stuttgart

Others involved in the project: see page 108



Site plan
scale 1:5000

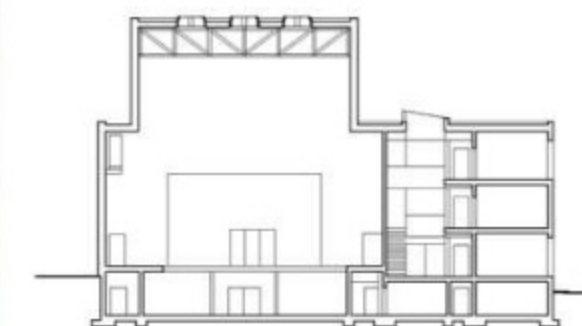
Sections · Layout plans
scale 1:750

1 Entrance
2 Foyer
3 Hall

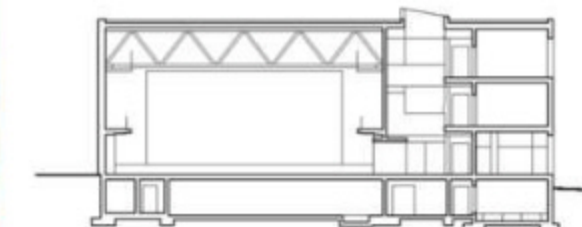
4 Stage
5 Rehearsal
6 "Circulation
seam"
7 Cloakroom
8 Changing room
9 Departmental
rooms
10 Broadcast studio

In Oststadt, a section of Karlsruhe, a conservatory's multi-media and stage complex – completed in 2013 – occupies a site in the immediate vicinity of a historic "maison de plaisance" that was reconstructed in the 1980s. The building is arranged in two parts. First, a large, mostly windowless box borders the new square to the north and contains a performance hall (seating an audience of more than 400), rehearsal spaces, and a foyer. The entrance to it is set back considerably from the facade's plane, giving the building massing a sense of depth; the oblique "reveal" accompanying the entrance directs the attention of persons in the foyer to the pleasure palace. Behind this larger massing, the second, narrow bar that is home to the departmental functions is aligned with the nearby buildings. A glazed slit, the "circulation seam", separates the two different wings of the building and provides light to the three-storey atrium space. The juxtaposition of black composite-wood board and white stucco is part of the overall colour and material scheme; it also makes the bi-partite building massing legible.

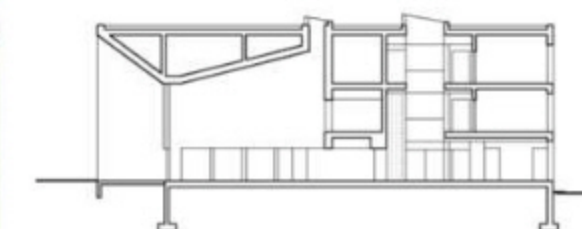
In reference to the neighbouring structures, the exterior of the rear wing was executed in cream-toned EIFS. The fly tower and the reveal at the entrance are rendered a radiant white. Consequently, both constitute a marked contrast to the dark main facade, which is sheathed in 1.25-metre-long extruded ceramic elements. The "folded" cross-section gives the impression of vertical rods. By combining the four different modules (i.e. four different cross-sections) in different arrangements, the architects created a texture in which horizontal bands are perceptible. The ceramic glaze, produced in an annealing process, is iridescent and, under certain lighting conditions, seems metallic. The slight irregularities in the ceramic modules are a subtle foil to the rigorous wall-cladding systematisation; they give the facade a hint of hand-craftsmanship, and, consequently, link it to the dark-brown cornices and pilasters of the adjacent Renaissance facade.



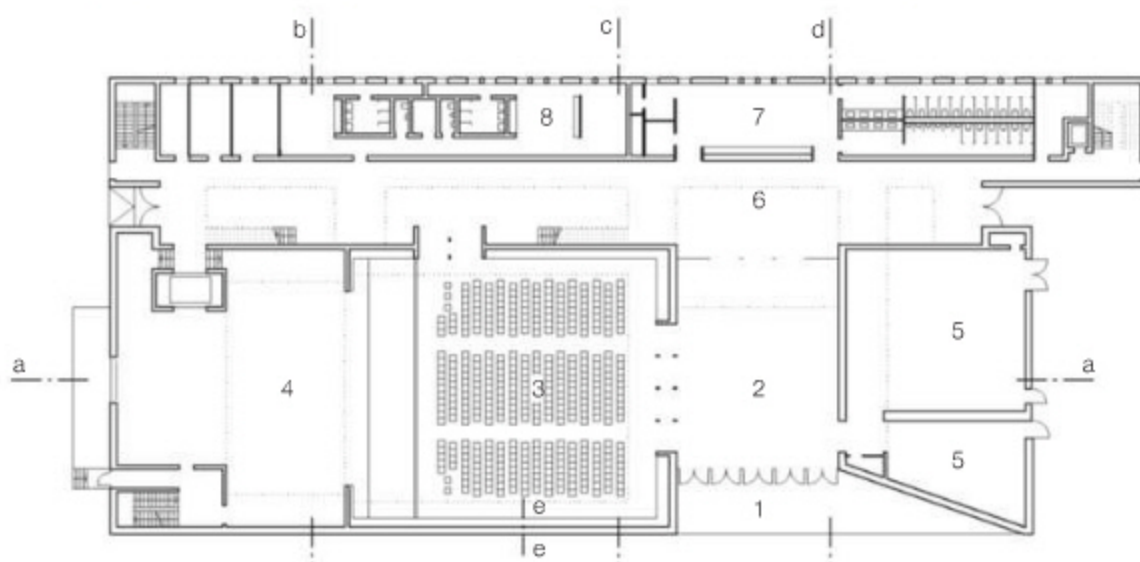
bb



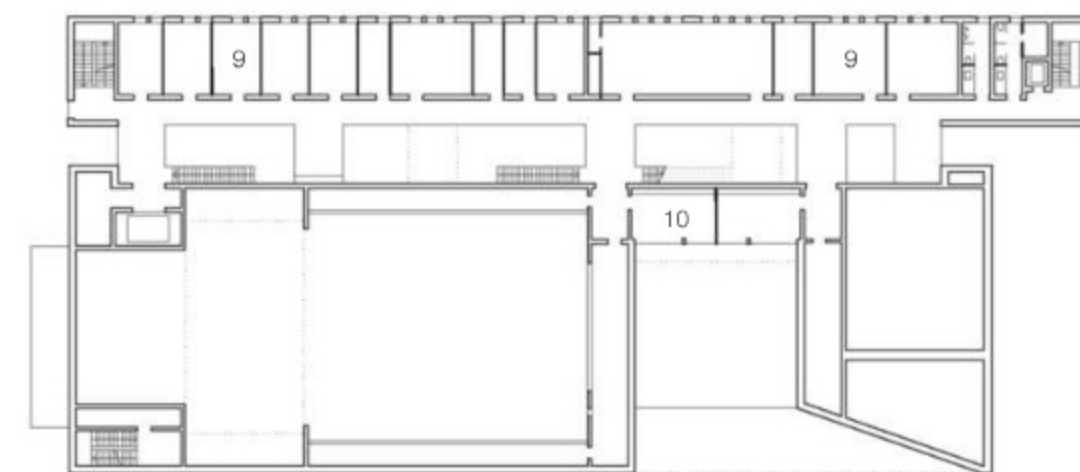
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dd

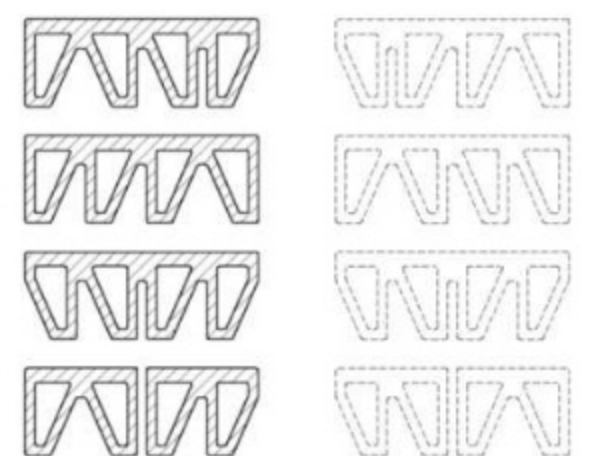
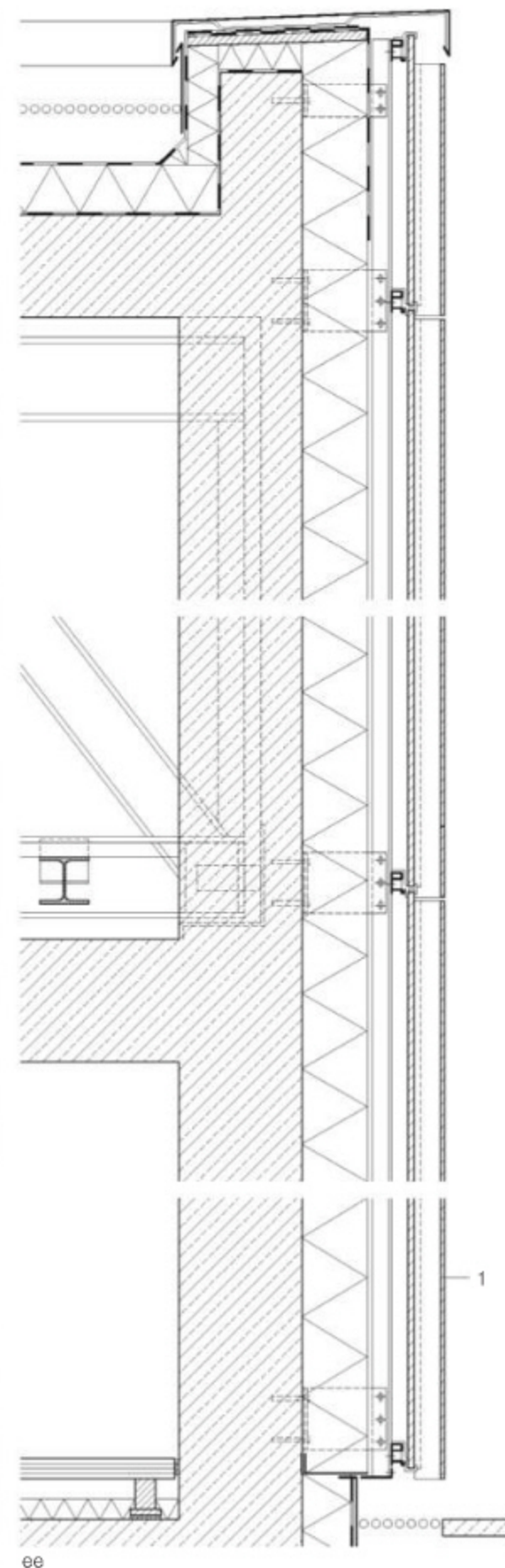
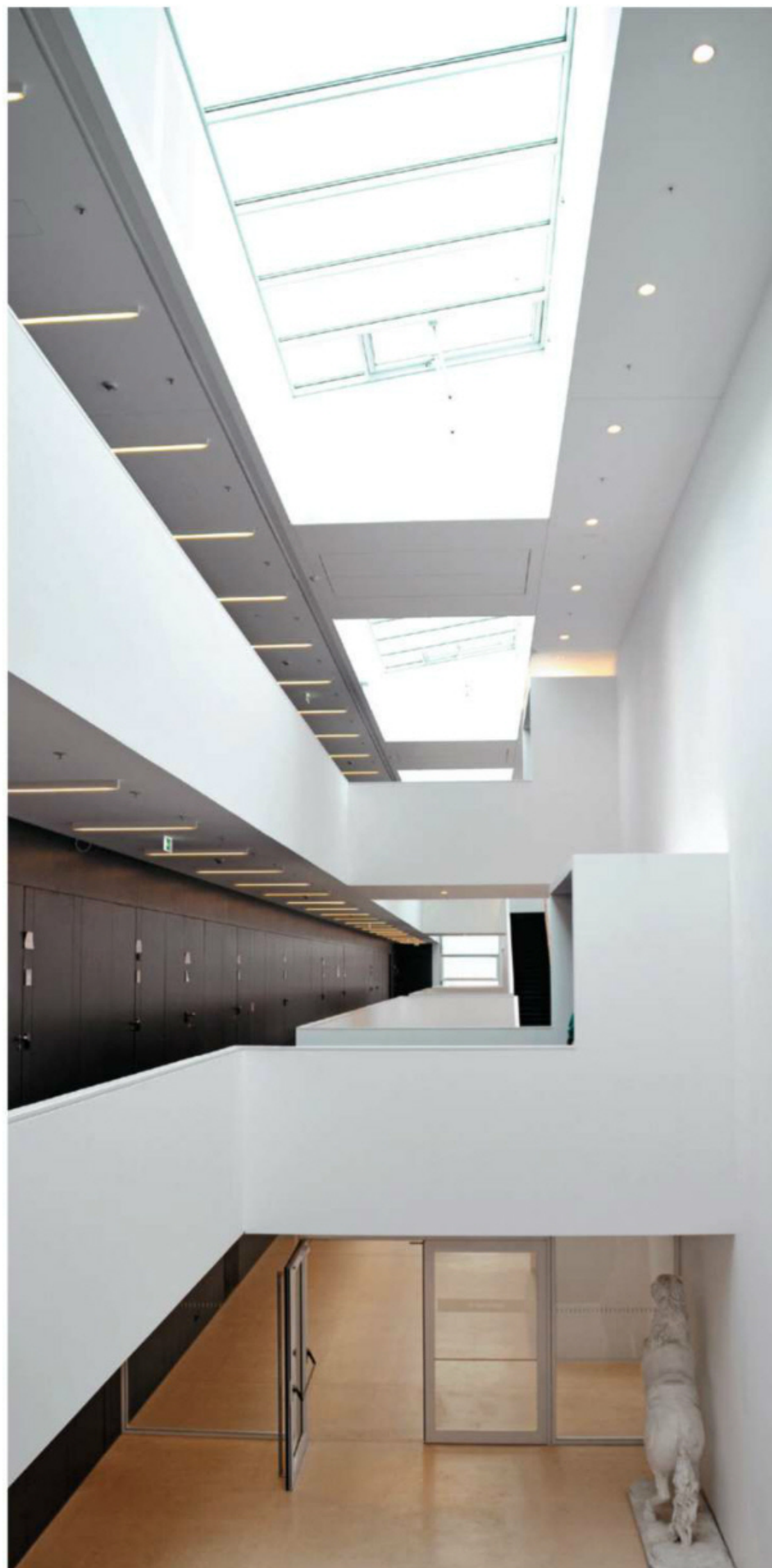


Ground floor



1st floor





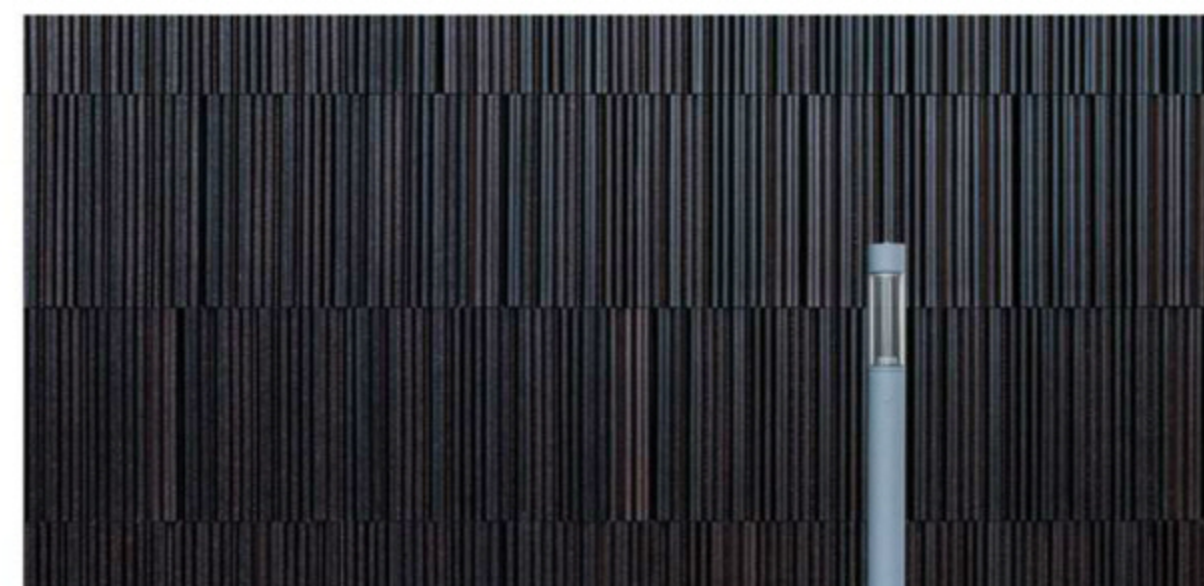
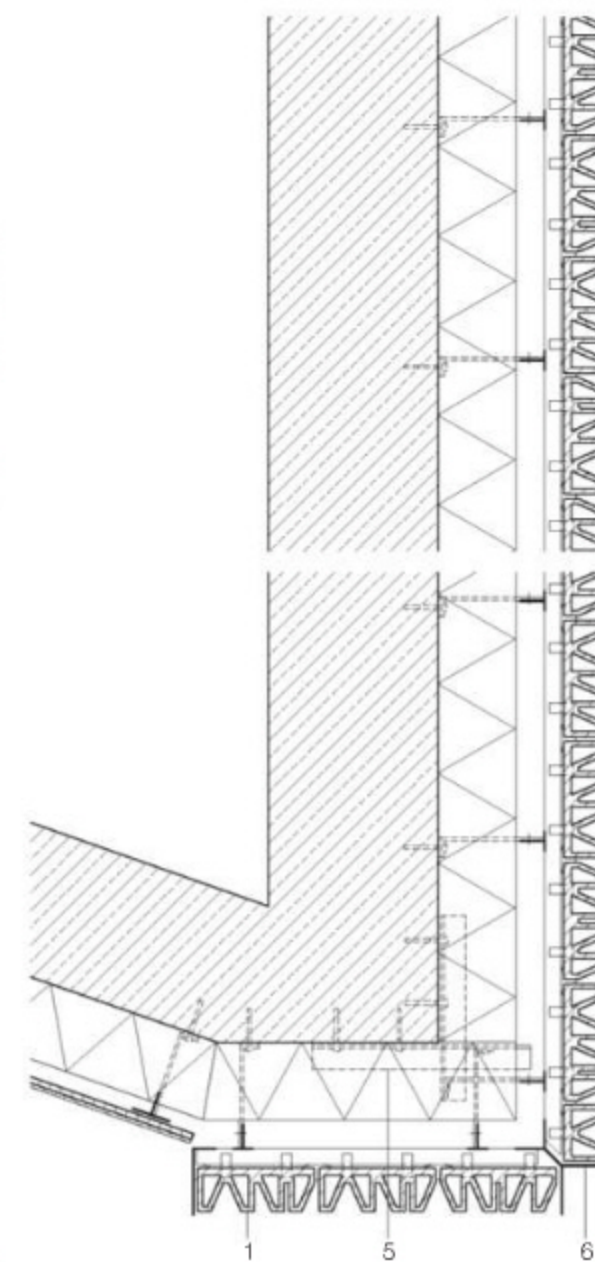
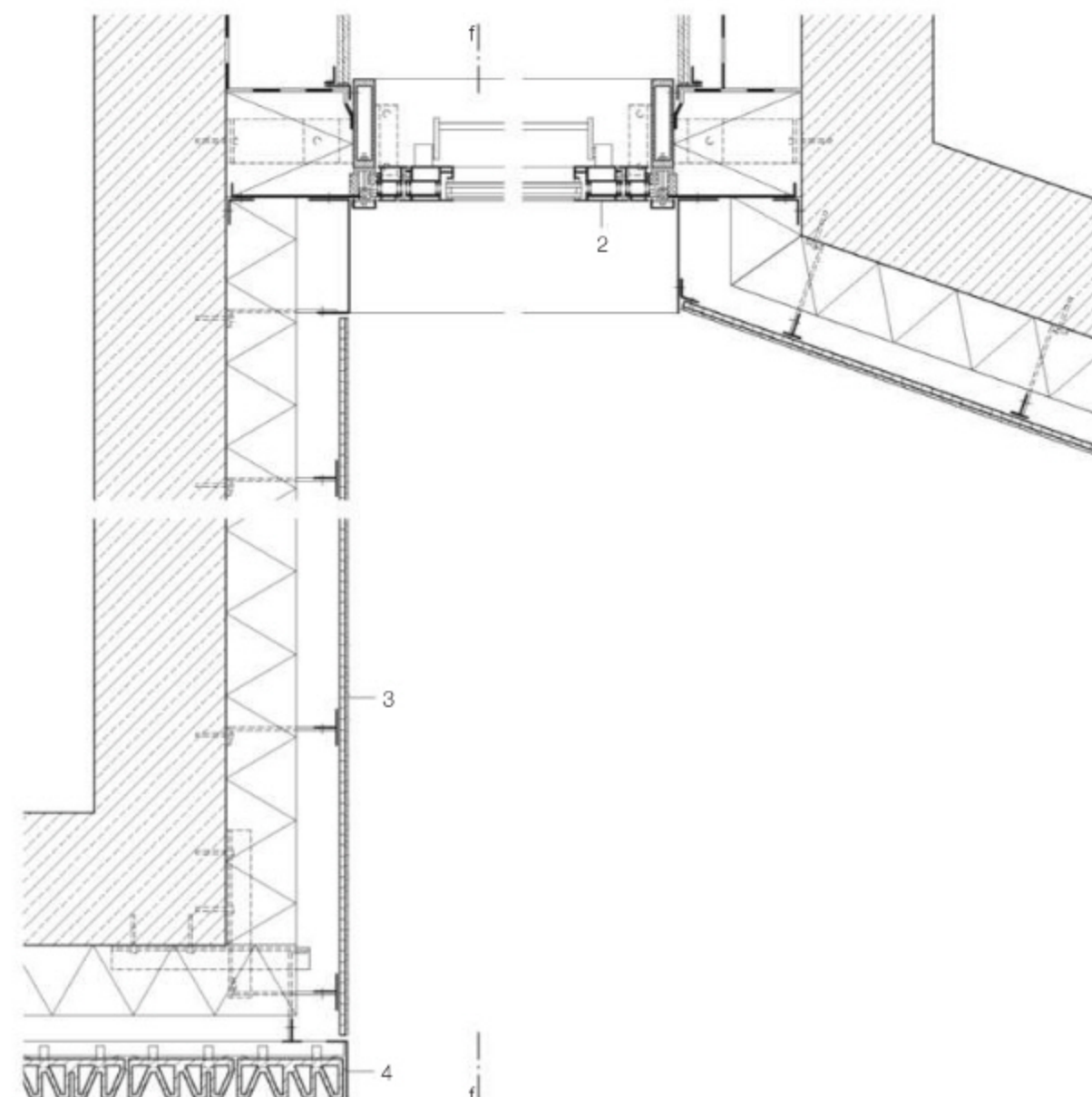
standard

mirrored

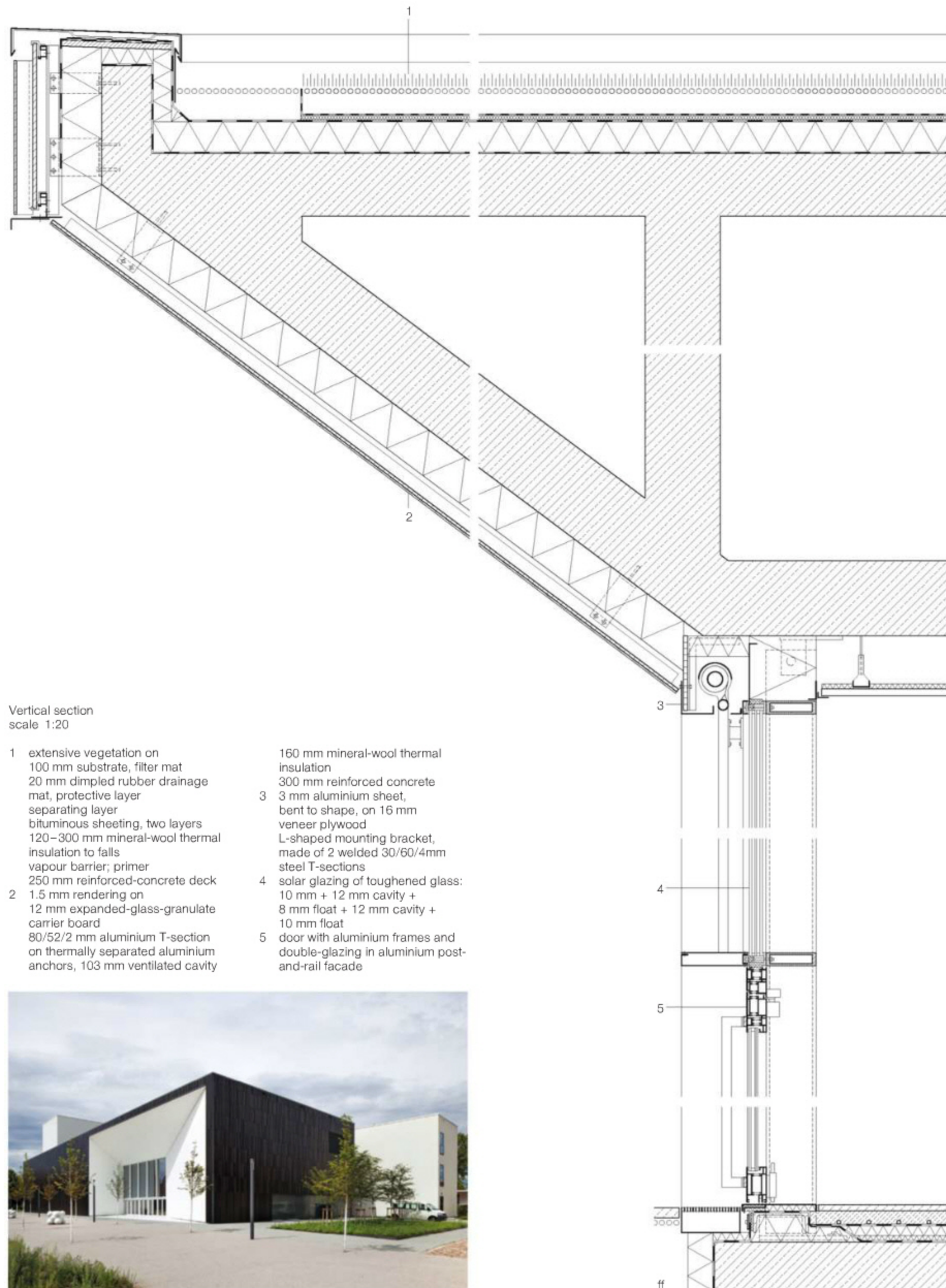
- 1 1250/250/90 or 1250/125/90 mm extruded ceramic facade module, five different cross-sections, surface: dark-grey glaze on 40 mm aluminium supporting structure 40/52/2 mm aluminium T-section on thermally separated aluminium anchors/60 mm ventilated cavity 160 mm mineral-wool thermal insulation wall: 300 mm exposed concrete
- 2 doors with aluminium frames and double-glazing in aluminium post-and-rail facade
- 3 1.5 mm rendering on 12 mm expanded-glass-granulate carrier board 80/52/2 mm aluminium T-section on thermally separated aluminium anchors/103 mm ventilated cavity 160 mm mineral-wool thermal insulation exterior wall: 300 mm exposed concrete
- 4 140/50/4 mm aluminium-angle reveal
- 5 50/50 mm aluminium-channel corner bracket
- 6 corner: 100/100/4 mm aluminium angle welded to web and mounting bracket

Vertical section
Horizontal section
scale 1:20

Ceramic module variants
scale 1:10



To achieve an animated facade texture, prefabricated ceramic elements in five different cross-sections were manufactured. In addition, the 125-cm-long extruded modules can also be inverted – in other words, mirrored – when mounted, which results in ten different appearances. The distance between narrow ribs, which give the impression of rods, varies; this creates a texture in which horizontal bands are perceptible.



Renovation and Extension of Communal Hall in Männedorf

Architects:

SAM Architekten und Partner, Zurich

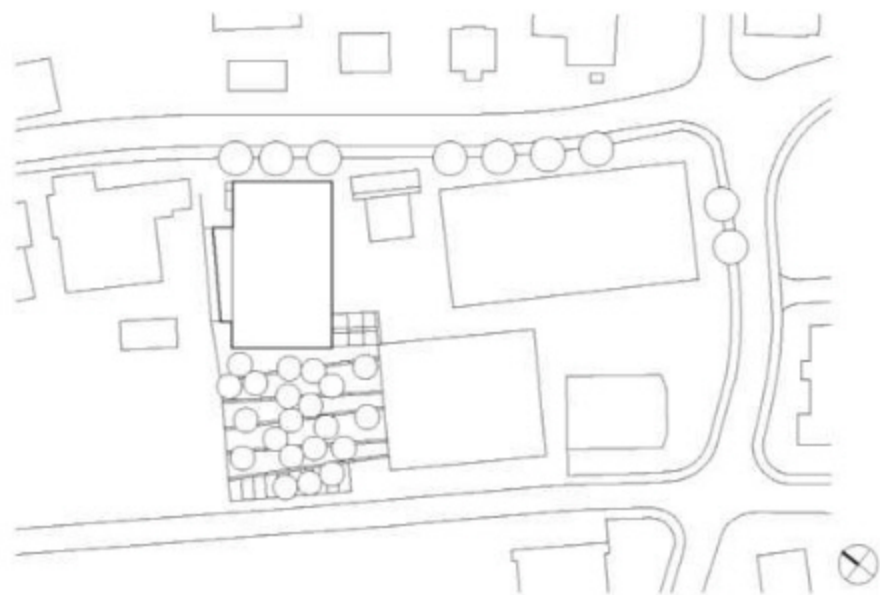
Team:

Sacha Menz, René Antoniol,
Christoph Schneider, Karin Läderach,
Rahime Osmani, Kirsten Bohnert,
Kristina Keutgen

Structural engineer:

Walt+Galmarini, Zurich

Others involved in the project: see page 108



A new outer envelope transforms a building dating to the 1940s into a community centre that can fulfil a great variety of functions and provides additional space for different organisations' meetings and events. The centre is part of an ensemble consisting of a new commercial building, a new house for the church parish, and a village square that is accentuated by a water feature. The architects took the original building – which now houses only the main hall – as point of departure and added a foyer, kitchen wing, and stage.

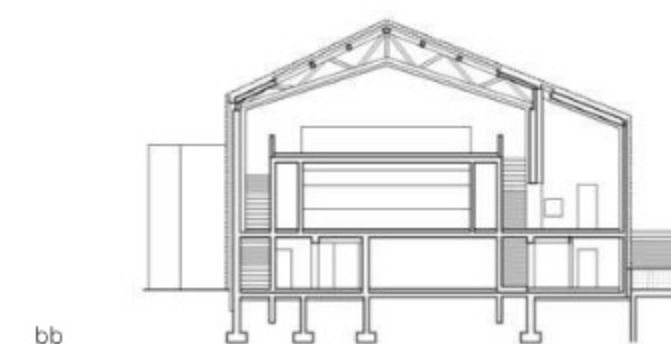
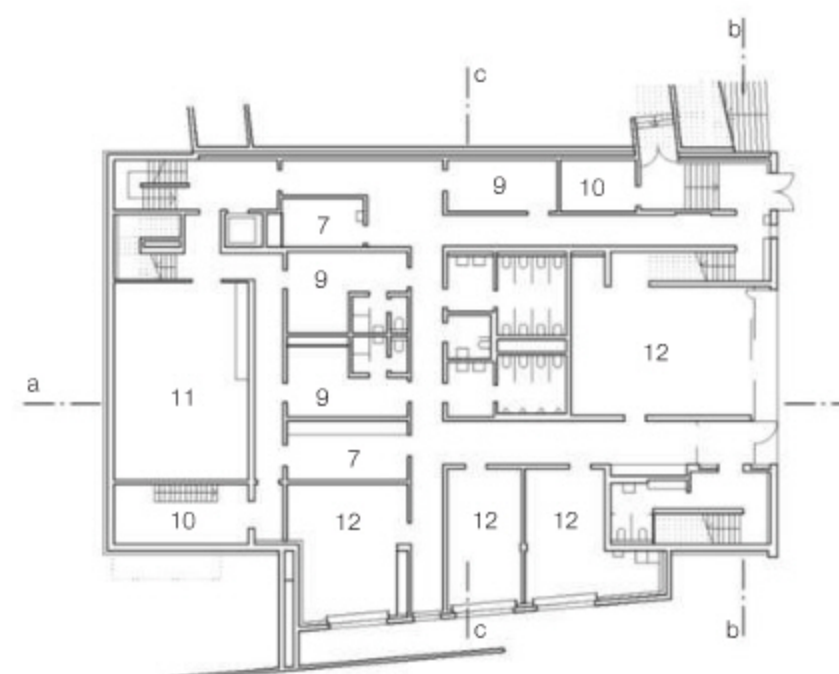
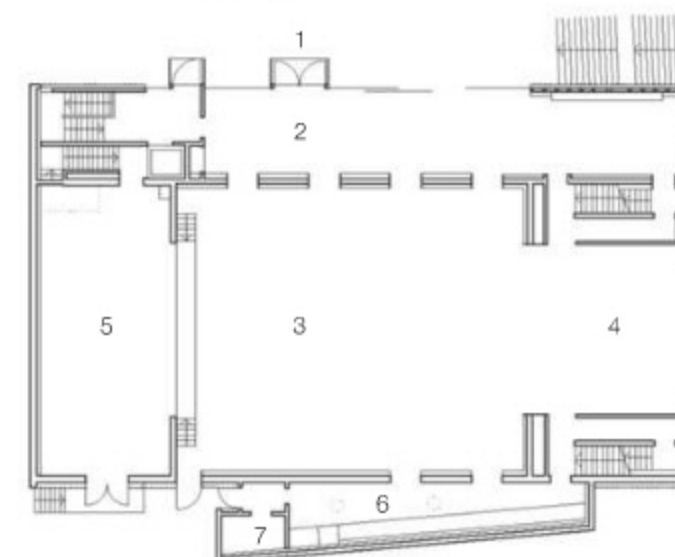
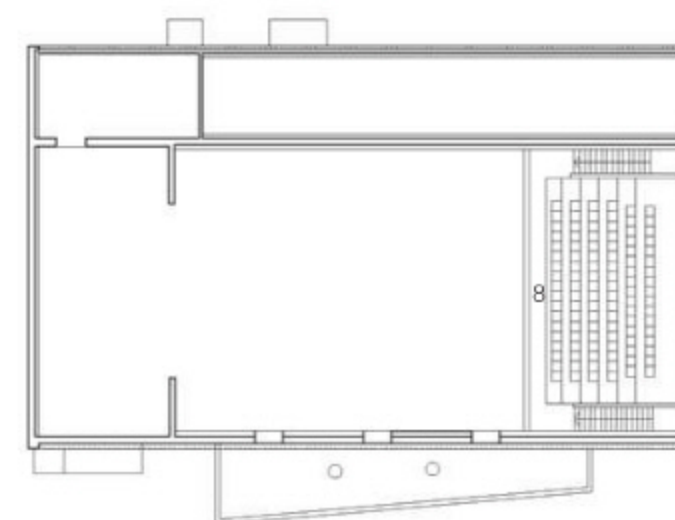
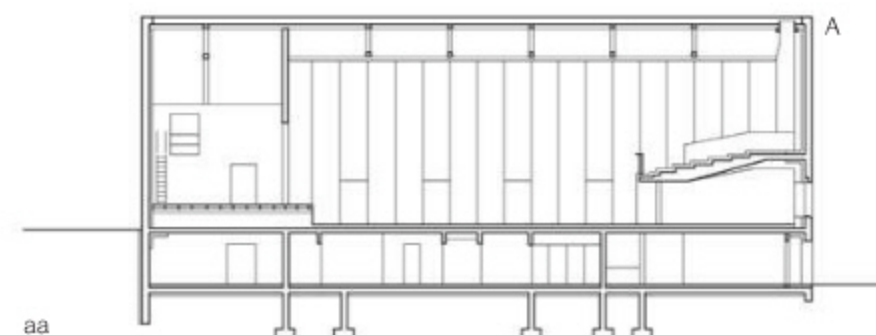
The exposed-concrete shell and expanded-metal skin give the building a distinctive character. The surface of the two asymmet-

rical gable facades and the kitchen wing is exposed concrete with an iridescent coating. In between the expanded-aluminium skin sheathes the long elevations and the roof, and an over-sized protective mesh reminds visitors that this is a wine-growing region. The sides of the individual elements overlap and are mounted at intervals to the supporting structure. The expanded metal's surface (clear-anodised) reflects ambient colours; the impression it makes changes over the course of the day.

Although simple materials are used, the precise, striking formgiving gives the new community centre a refined aura. The roof form can now be experienced in the large hall,

because a new structure employing scissor trusses has been inserted. The interior cladding of the walls and ceilings in the main hall fulfil an acoustic function and are embellished with imagery related to wine-growing themes; vertical strips of oak supply the murals with rhythm. The glass spheres incorporated in the suspended luminaires make reference to – larger than life – grapes on a trellis.

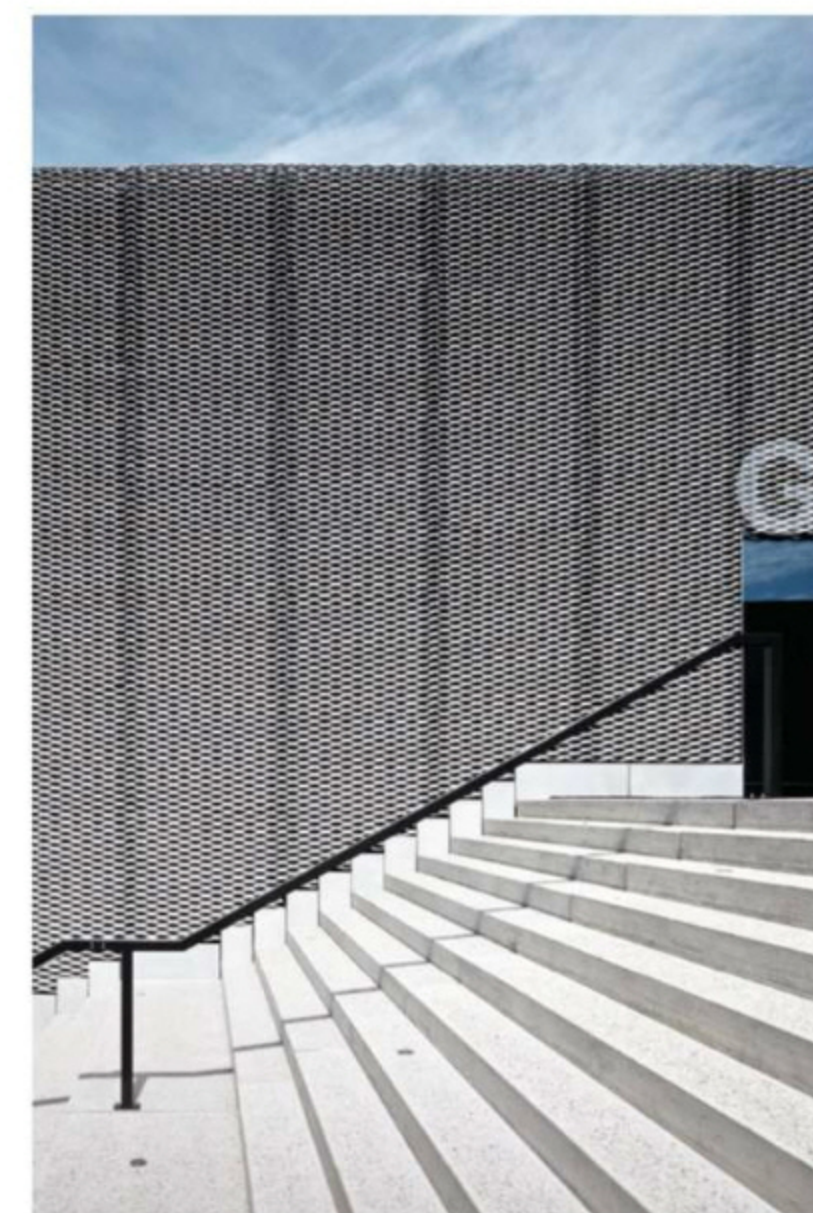
The clubrooms on the lower level have been re-organised to provide space for a nursery. Mature cherry trees inhabit the gravel-covered square in front of it; this space serves as a meeting place for all the residents of Männedorf.



Site plan
scale 1:2000

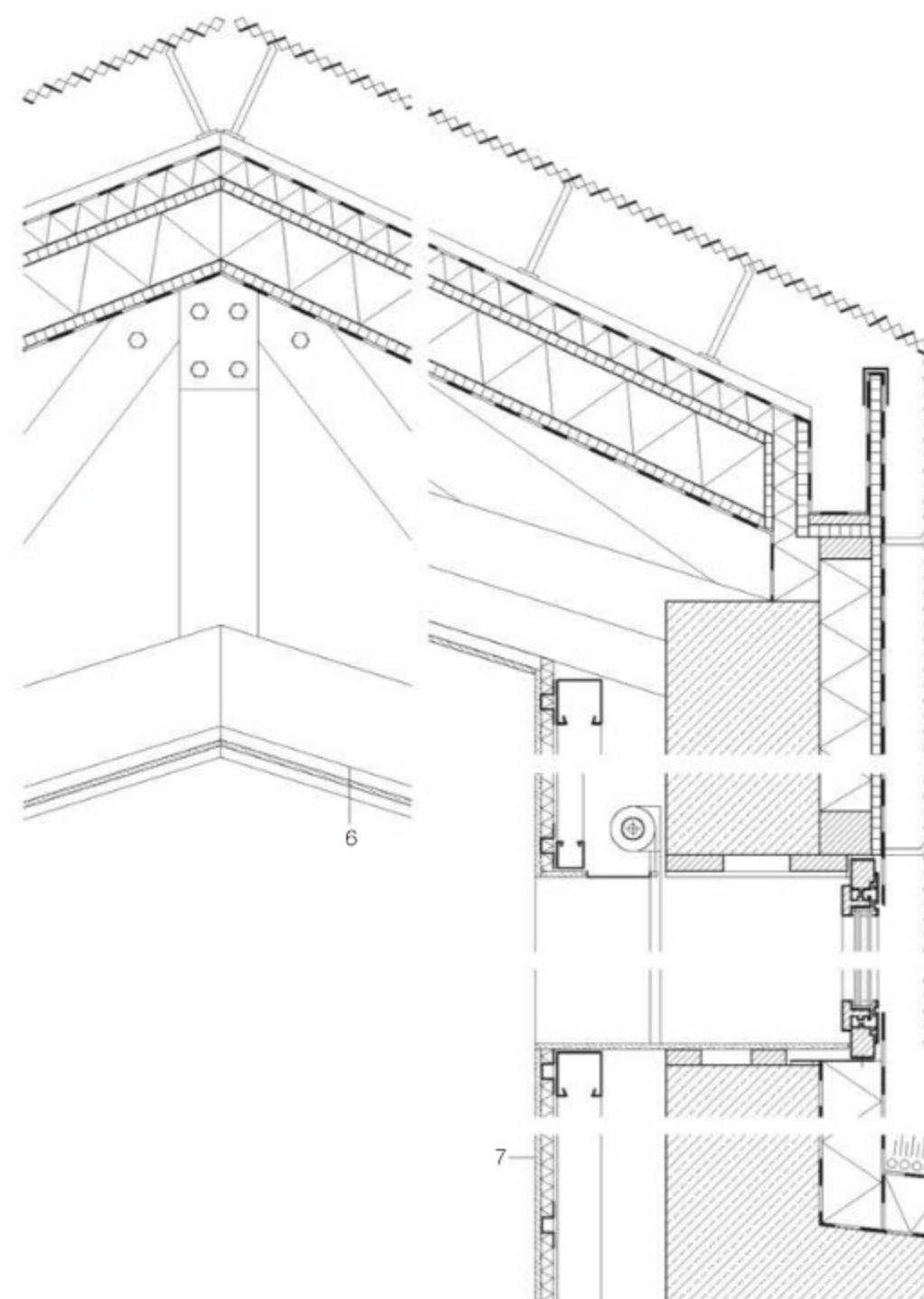
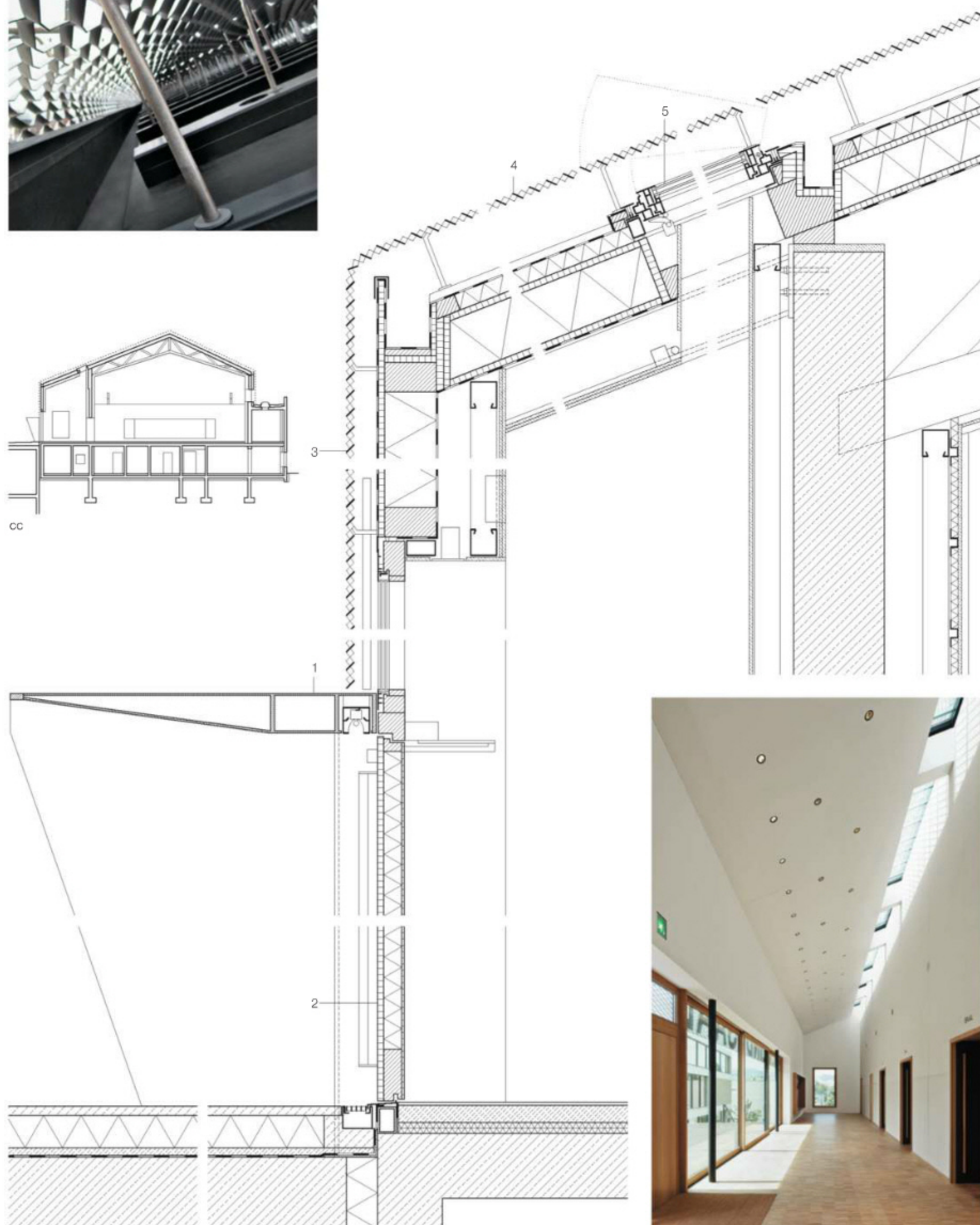
Layout plans
scale 1:500

- | | |
|-----------------|----------------------|
| 1 Main entrance | 7 Storage |
| 2 Foyer | 8 Gallery |
| 3 Main hall | 9 Cloakroom |
| 4 Small hall | 10 Building services |
| 5 Stage | 11 Props |
| 6 Kitchen | 12 Club room |





Section
scale 1:500
Sectional detail
scale 1:20



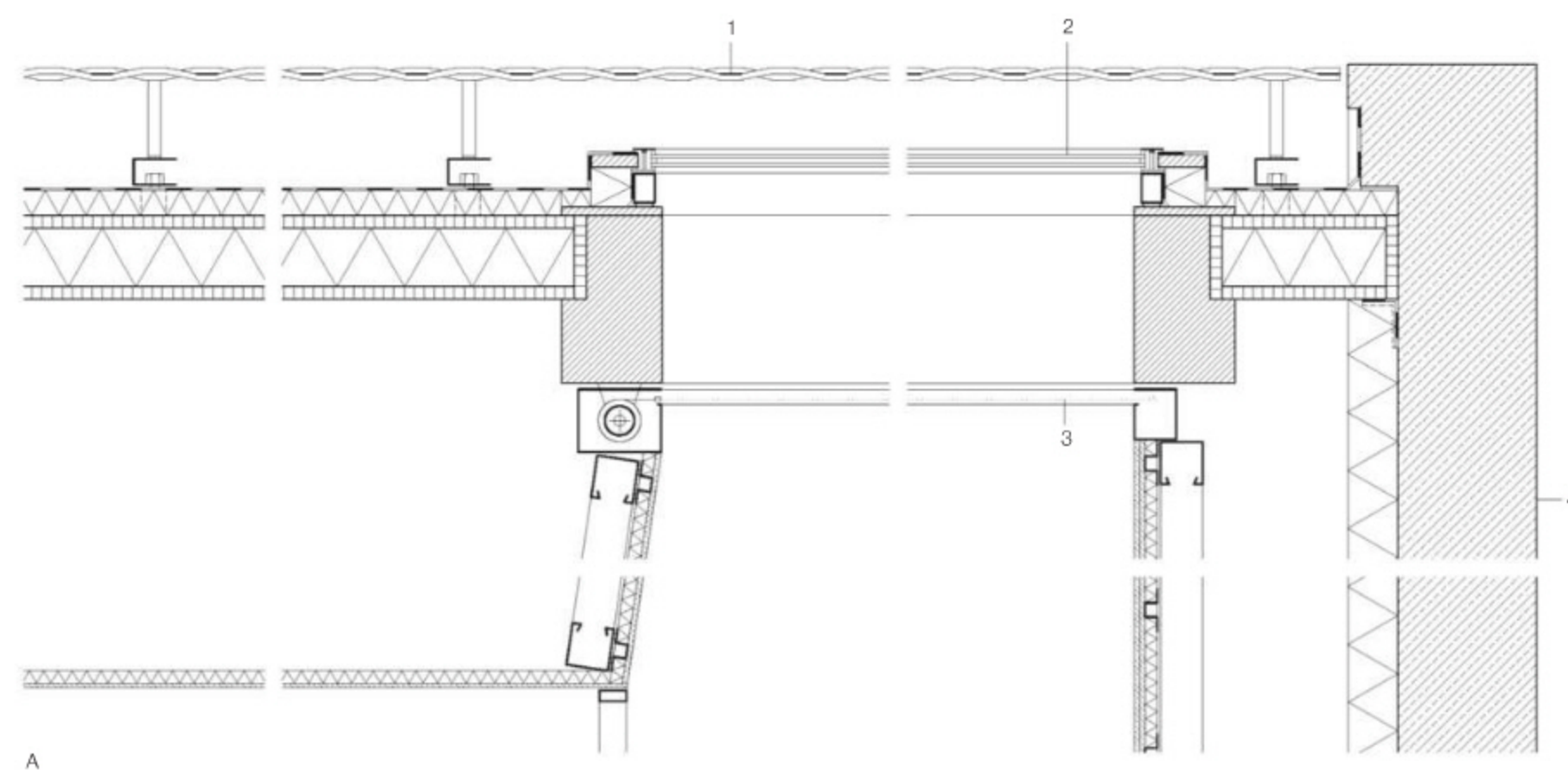
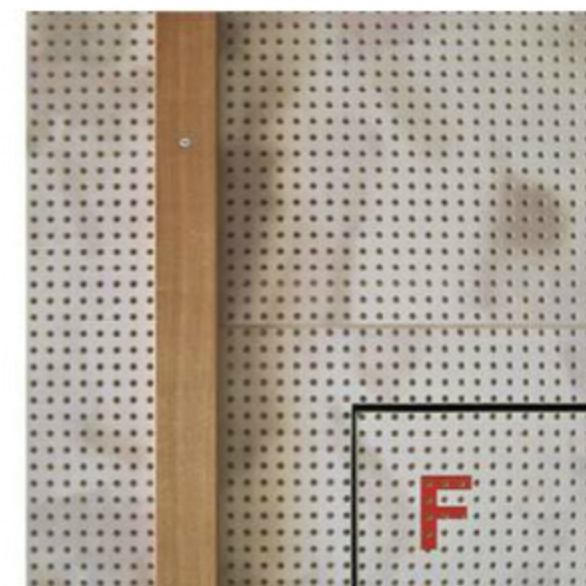
- 1 canopy:
5 mm sheet steel
- 2 70 mm door leaf,
oak veneer on both sides, oiled
- 3 3/30 mm expanded metal, aluminium,
anodised, mesh size: 200/70
90 mm distancer
house wrap, black
22 mm oriented-strand board
200 mm insulation/timber studs
vapour retarder
240 mm building services layer/metal
supporting structure, partial insulation fill
25 mm plasterboard
- 4 3/30 mm aluminium expanded metal,
anodised
230 mm distancer
30 mm mounting profile
2 mm EPDM sealant
60 mm softboard
260 mm wood composite element
with mineral-wool insulation
210 mm wide-flange I-beam
25 mm plasterboard
- 5 roof light, operable
- 6 timber truss
- 7 interior cladding:
12.5 mm plasterboard, perforated,
imprinted
30 mm top-hat profile/mineral fibre
100 mm metal stud
155 mm building-services layer
- 8 roof light:
acrylic glass



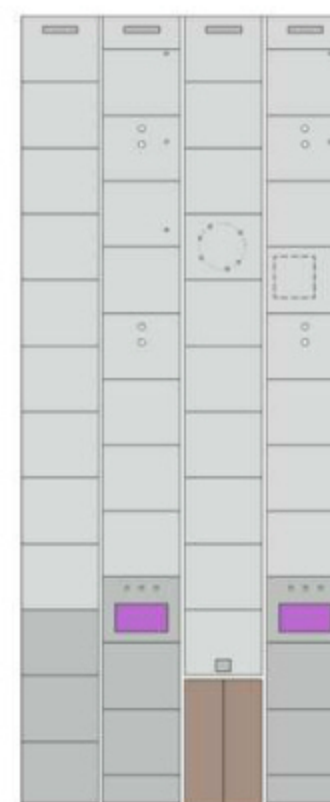


Developed view of walls
(excerpt) scale 1:125
Section scale 1:20

- 1 3/30 mm expandet metal, aluminium, anodised
230 mm distancer
30 mm steel profile
2 mm EPDM sealant
60 mm softboard
200 mm wood composite element, insulated
- 2 roof light, fix
- 3 blackout blind
- 4 330 mm reinforced concrete
120 mm insulation
355 mm building-services layer
100 mm metal stud
30 mm top-hat profile
25 mm plasterboard



A



Residence in Melbourne

Architects:
Sean Godsell Architects, Melbourne
Team:
Sean Godsell, Hayley Franklin
Structural engineer:
Perrett Simpson Stantin, Melbourne
Others involved in the project: see page 109

Roof plan
Sections • Layout plan
scale 1:400

- 1 Kitchen
- 2 Studio
- 3 Bathroom
- 4 Bedroom
- 5 Study
- 6 Laundry
- 7 Library
- 8 Terrace
- 9 Living/Dining
- 10 Entrance
- 11 Shed

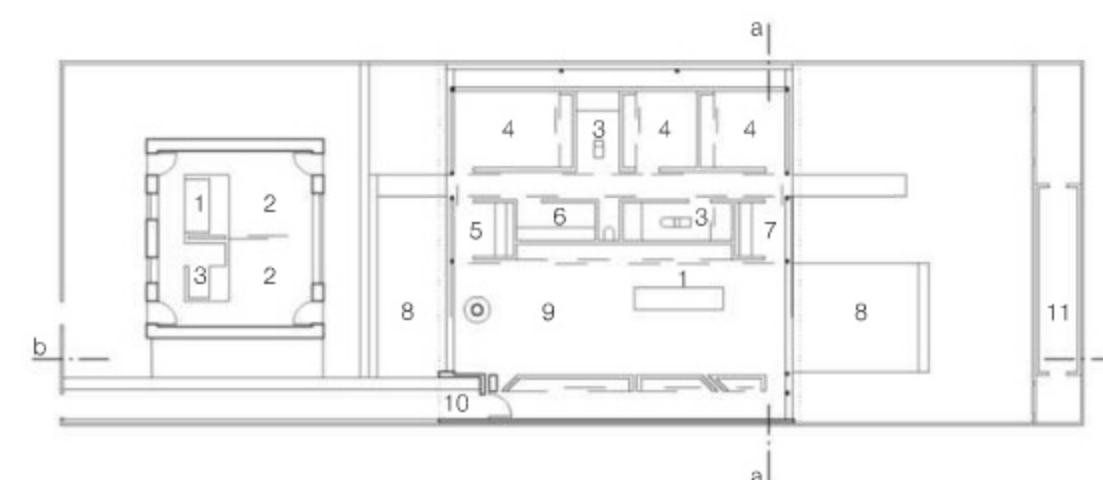
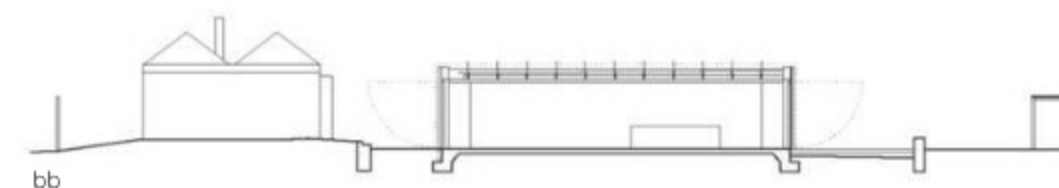
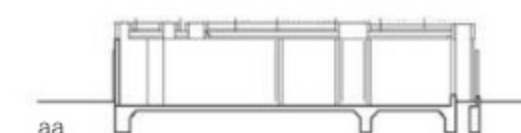
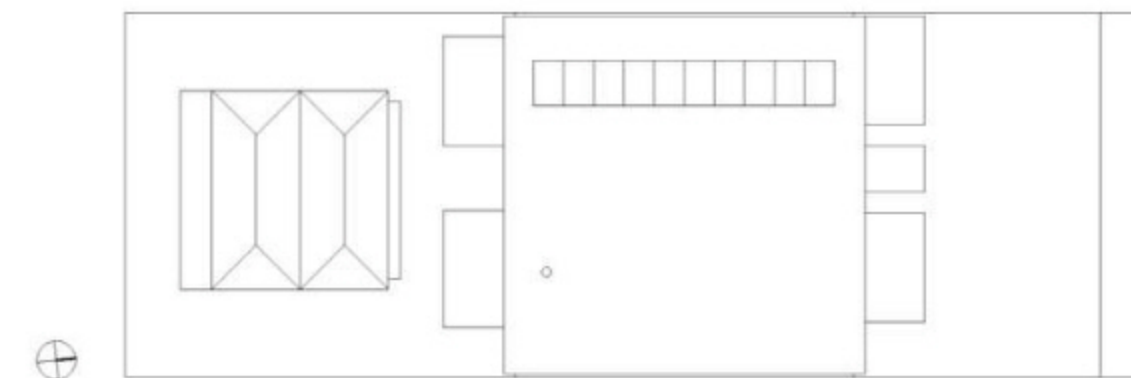


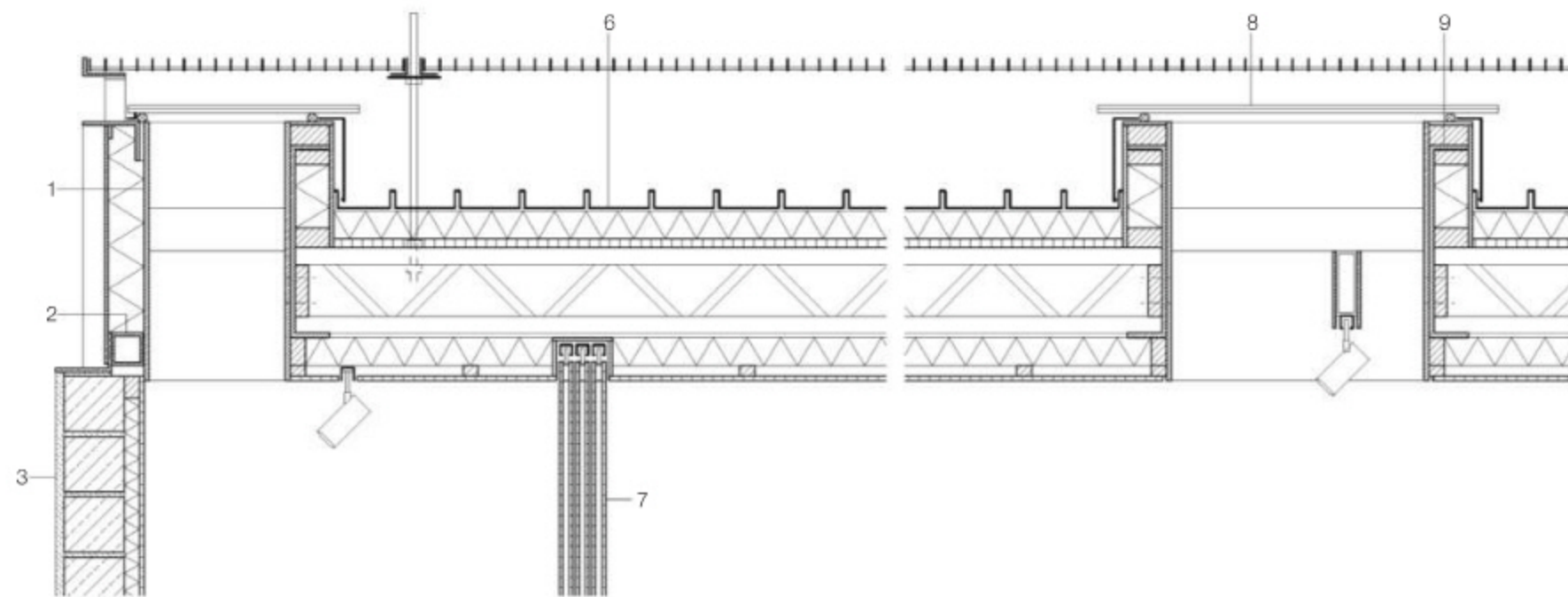
Sean Godsell's extraordinary residences – which, owing to their simplicity and materiality, appear to merge with Australia's primal landscape – have received international acclaim. Consequently, an urban site for a single-family residence, located only four kilometres from the centre of Melbourne, constituted a new challenge. Because he wanted to avoid the residual spaces that typically result from building setbacks at property lines, Godsell designed a single-storey structure with a sunken floor. In this manner he could make use of the entire width of the rectangular site without violating the local building ordinances.

The structure is screened from its high-density, heterogeneous surroundings by a wooden fence. A small, listed stone residence is situated between the new structure and the street; the clients – an artist and a musician and their three children – use it as an atelier. The main entrance is via a narrow corridor on the side of the building.

The home's interior is completely clad in wood: the surfaces of the floors, ceilings and walls are made of the wood of the blackbutt (*Eucalyptus pilularis*, a local tree that can attain a height of 50 metres or more), as are those of the floor-to-ceiling sliding doors, and the partition walls in the bedrooms, bathrooms, and closets.

The two corridors, parallel organising devices structuring the residence, are the only exception to the rule: their floors are untreated screed. The exterior is sheathed in a unifying translucent skin made of hot-dip-galvanised steel grating – it enwraps the entire building. At the residence's front and back elevations, the individual grating elements can be tilted up along the entire length of the facade, creating a pair of sunshaded verandas. Furthermore, the accompanying sliding doors facilitate a seamless transition from interior to exterior, a design decision underscored by the continuous flooring materials (blackbutt wood and screed). In sum, Godsell's design has produced a house that, despite its urban surroundings, thrives from its strong relationship to the outdoors.

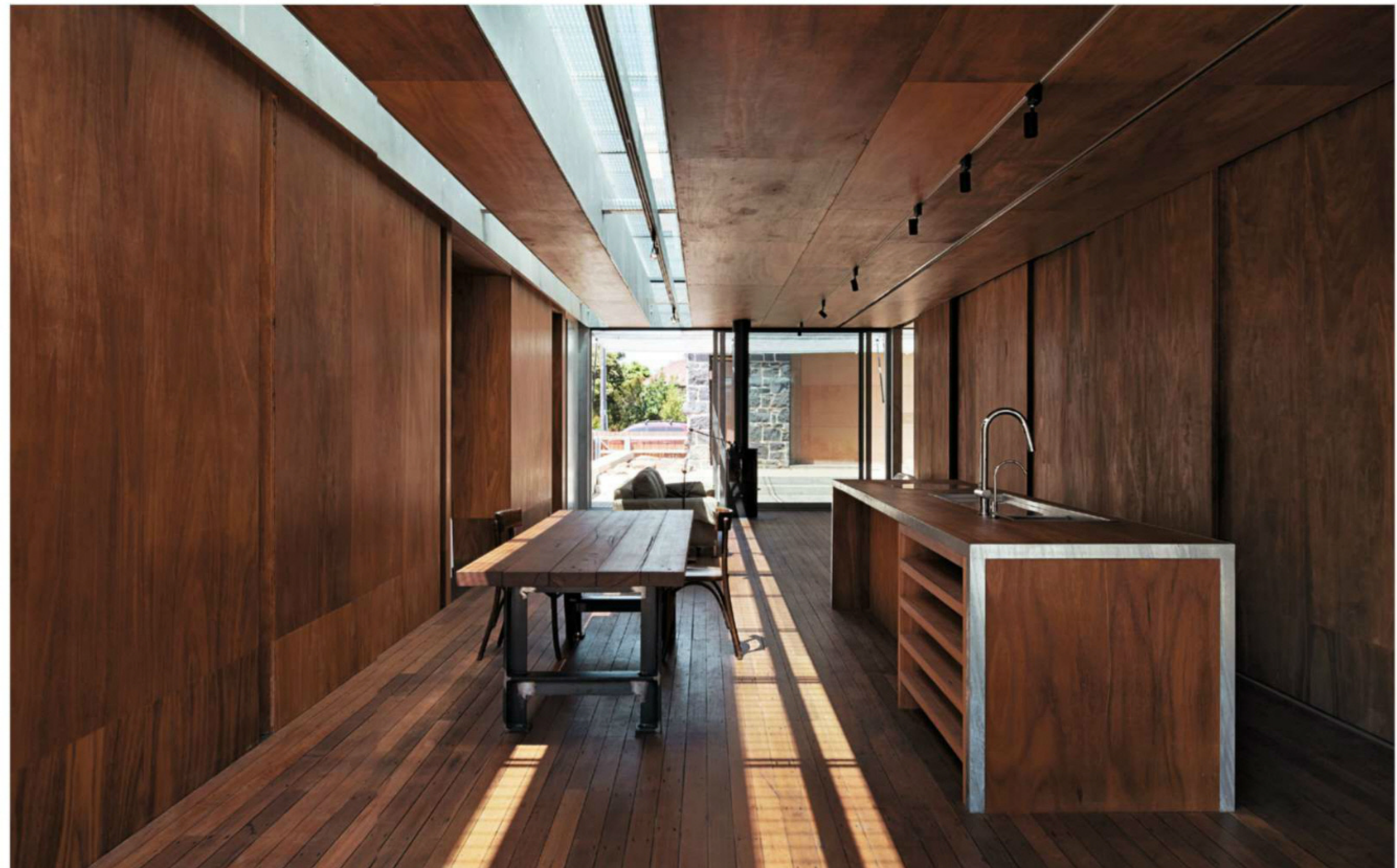
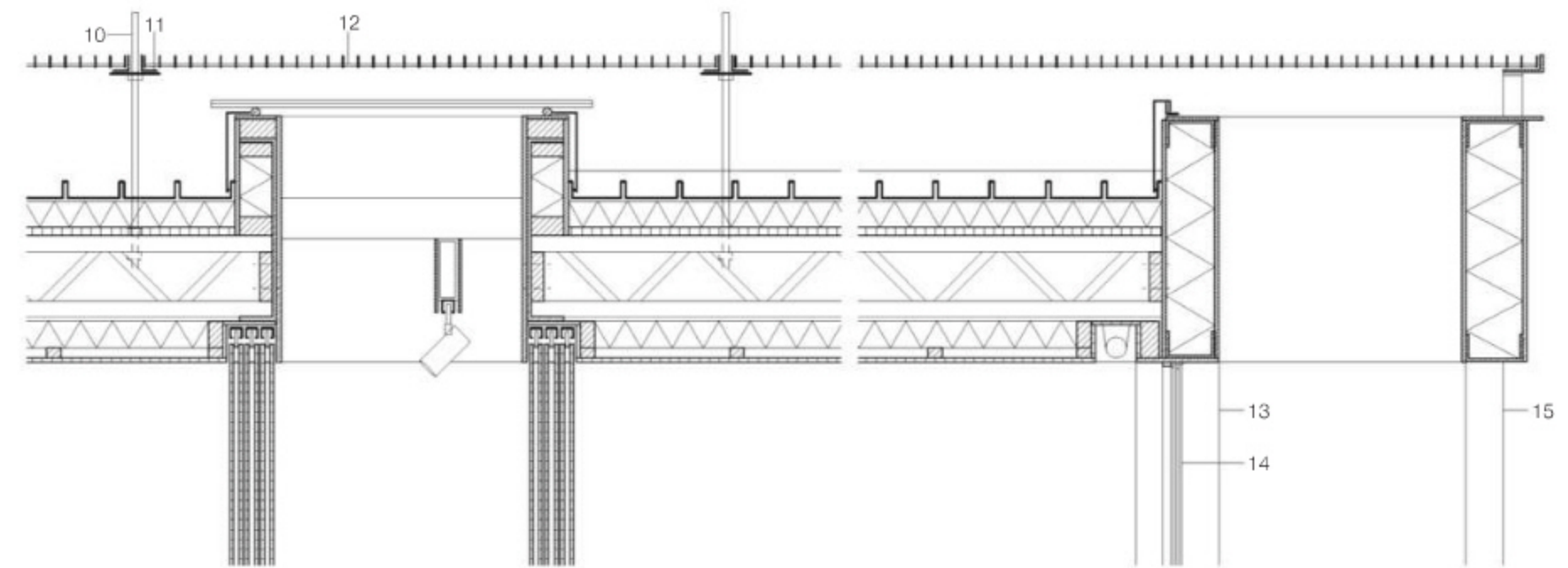
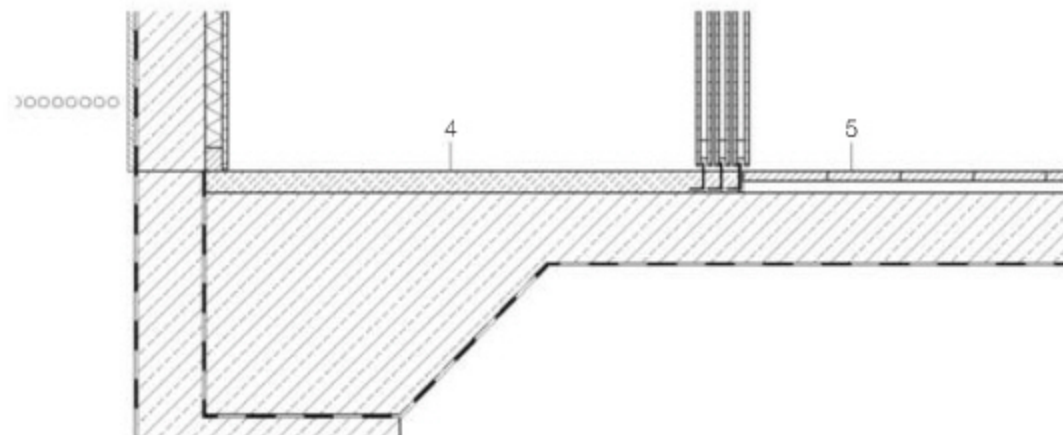


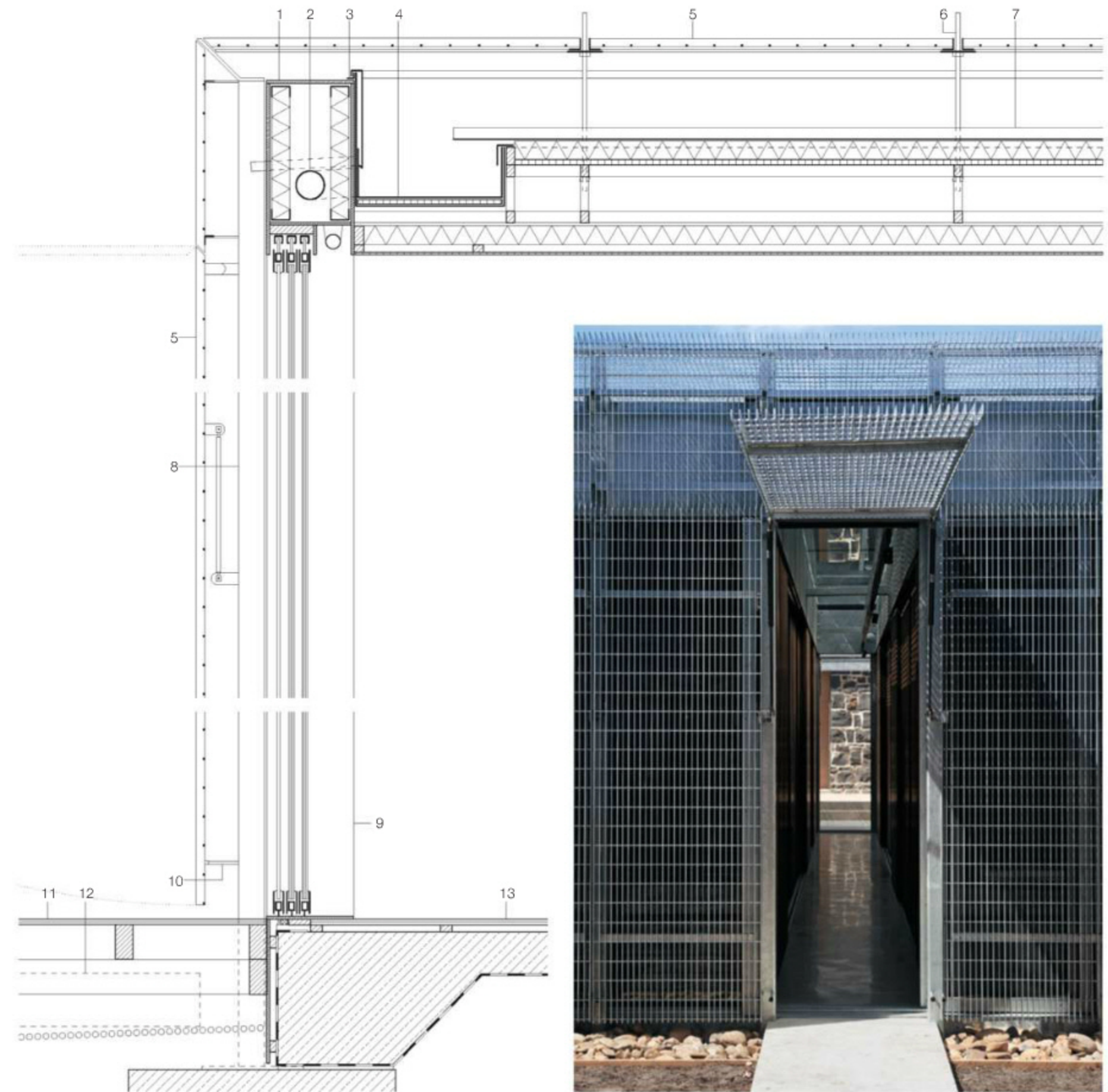
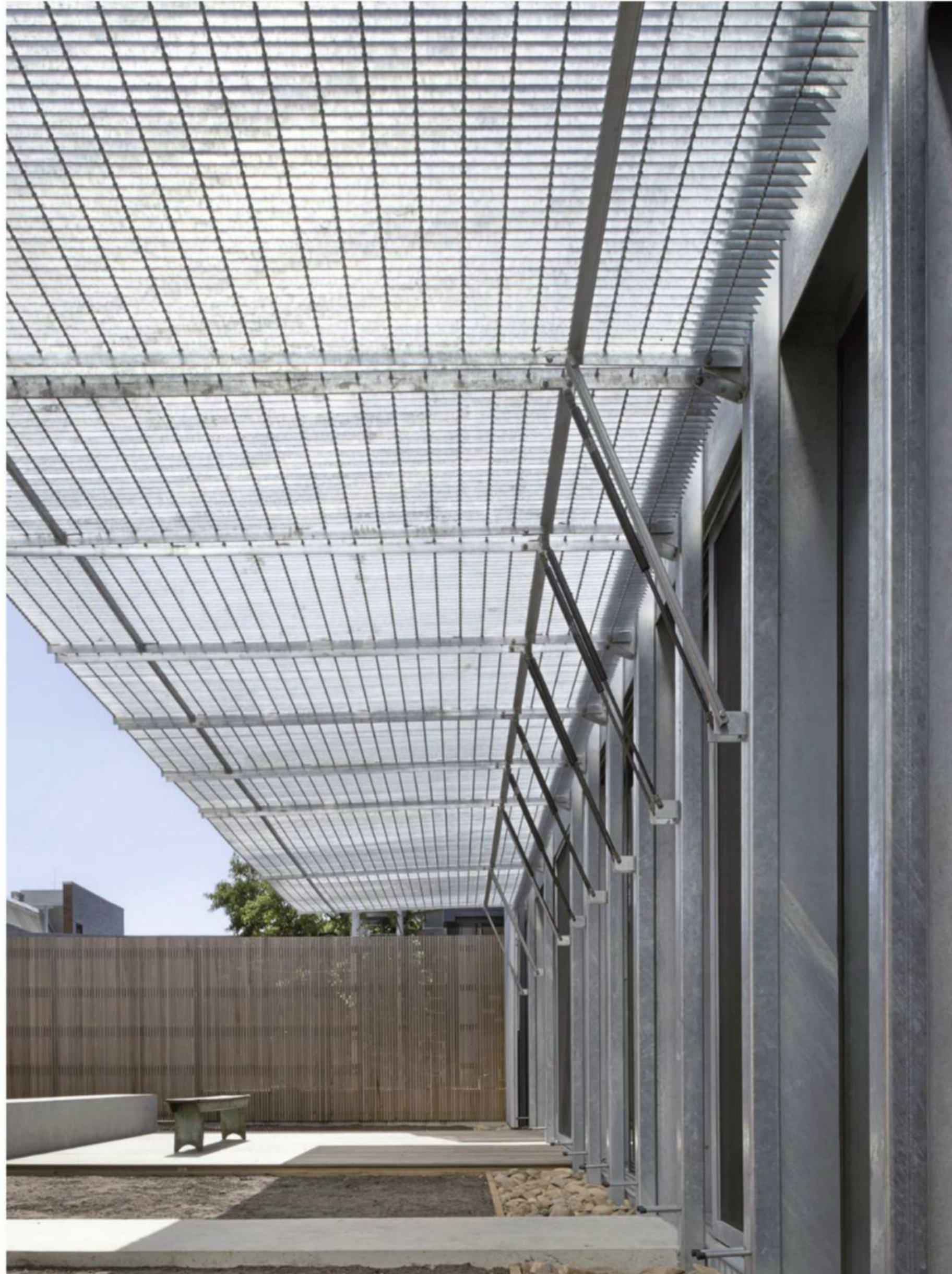


Vertical section
scale 1:20

- 1 12 mm steel flat, hot-dip galvanised
- 2 75/75 mm steel SHS
- 3 20 mm cement render
- 4 40 mm concrete screed
- 5 19 mm recycled blackbutt floorboards
- 6 steel sheet with

- aluminium-zinc-alloy coating
- acoustic insulation
- boarding
- 200 mm engineered parallel-chord truss; insulation battens; 9 mm blackbutt-faced plywood ceiling
- 7 sliding door: aluminium supporting structure, sheathed on both sides with 9 mm blackbutt-faced plywood
- 8 sky light: 6.4 mm laminated-safety glass of 2x toughened glass
- 9 steel beam, hot-dip-galvanised
- 10 16 mm threaded rod
- 11 40/40/5 mm steel angle
- 12 solar protection: 30/3 mm steel grating, hot-dip-galvanised
- 13 200/10 mm steel window frame, galvanised
- 14 double-glazing with low-e coating
- 15 column: 90/90 mm steel SHS, hot-dip-galvanised





Section
scale 1:20

- 1 300/500 mm steel beam, hot-dip-galvanised
- 2 Ø 100 mm PVC-U drainage pipe
- 3 30/30/3 mm steel angle
- 4 gutter: 0.7 mm steel sheet with aluminium-zinc-alloy coating on plywood, watertight

- 5 solar protection: 30/3 mm steel grating, hot-dip-galvanised
- 6 16 mm threaded rod
- 7 steel sheet with aluminium-zinc-alloy coating
- 8 acoustic insulation
- 9 200 mm engineered

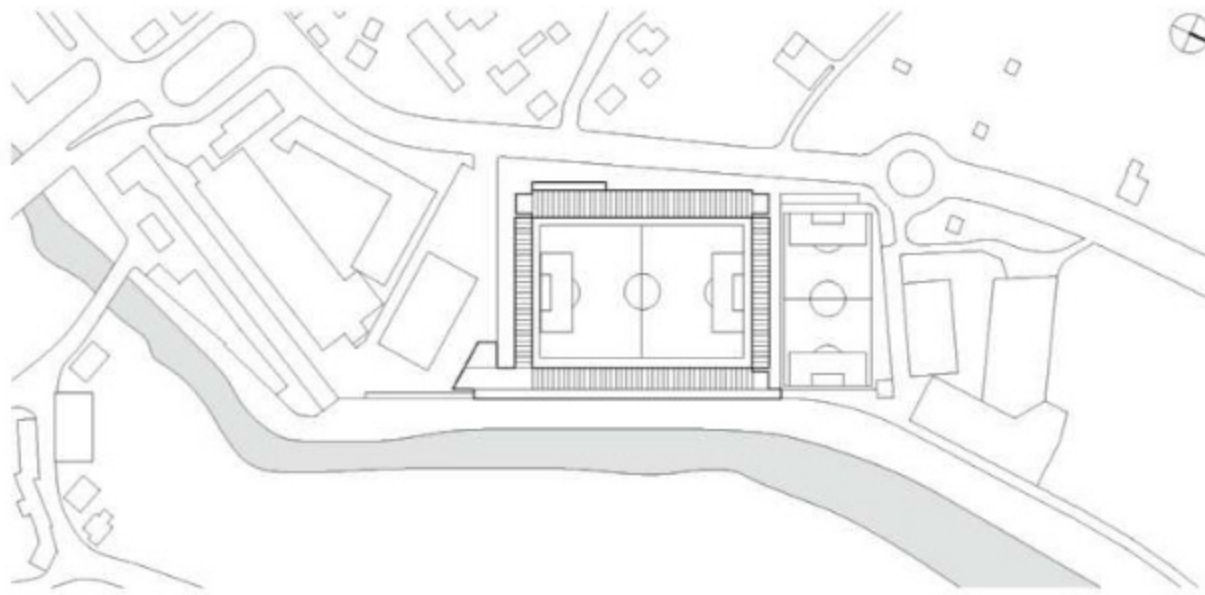
- parallel-chord truss insulation; battens
- 9 mm blackbutt-faced plywood ceiling
- column: 90/90 mm steel SHS
- 10 window frame: 300/10 mm steel, hot-dip-galvanised

- 10 threaded rod with rubber dampers
- 11 19 mm recycled blackbutt boards
- 12 rainwater collection tank
- 13 19 mm floorboards, blackbutt, recycled
- 50/30 mm timber battens
- 150 mm reinforced-concrete slab on grade
- tanking membrane

Soccer Stadium in Torrelavega

Architects:
MMIT Arquitectos, Maliaño
Javier Teran Alonso, Agustín Montes
Gaisán, Alberto Montes Gaisán
Team:
Marco Antonio Medrano Navarro
Gorka Blas Revilla
Structural engineer:
Estudio Dynamis, Santander
Others involved in the project: see page 109

 www.detail.de



The new Malecón Stadium in Torrelavega in northern Spain stands on the site of the former stadium. The brief stipulated that the latter's playing field and the four floodlight masts that were installed in 2005 be retained. In addition, the club required 6000 seats and commercial spaces at the main entrance on Ronda Boulevard. At 4,100,000 euros, the budget was quite tight; consequently, a concept with a considerable amount of prefabrication was essential to the construction.

Within these stipulations the architects developed a clear configuration made up of four separate sets of stands. The stadium's corners are occupied by subordinate struc-

tures. The two sets of stands along the boulevard and Río Besaya are slightly taller and wider than the two bordering the narrow lengths of the playing field.

A clear, rhythmic succession of slender, orthogonal steel frames is the dominant feature on the stadium's four sides. Because the frames are only 2.70 metres apart, a person viewing them from an angle sees only these fins; moreover, the black coat of paint reinforces the austere, almost unapproachable look of the exterior. But when nearing the stadium frontally, one sees the concrete panels that enclose the stands and the glazed corridor on the upper level. Vertical sheet-steel elements sheathe the

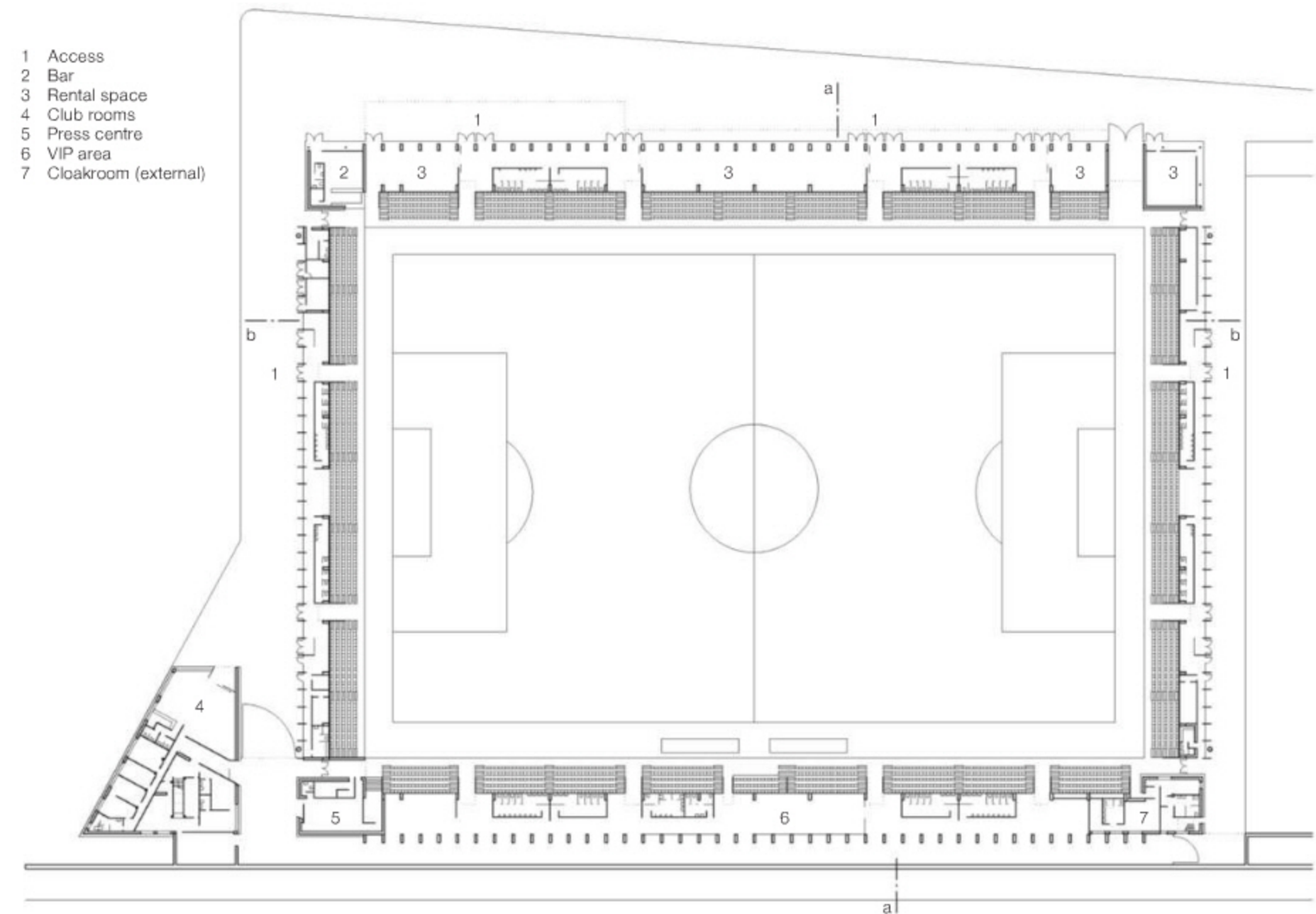
ground-level zone. Excerpts of the club's theme song are discernible in the playful arrangement of letters of the alphabet (cut out using CNC flame-cutting). At night the facade is backlit, a measure that makes the entrance elevation look lightweight and permeable. The interior atmosphere is determined by the four imposing edges of the roof and the undersides, which consist of backlit fields of steel grating. By working with cantilevering roofs here, the architects created an alternative model to the "bubbling cauldron", a type built with a specific goal: to intimidate visiting teams. These roofs are a rigid yet open black frame for the green lawn.

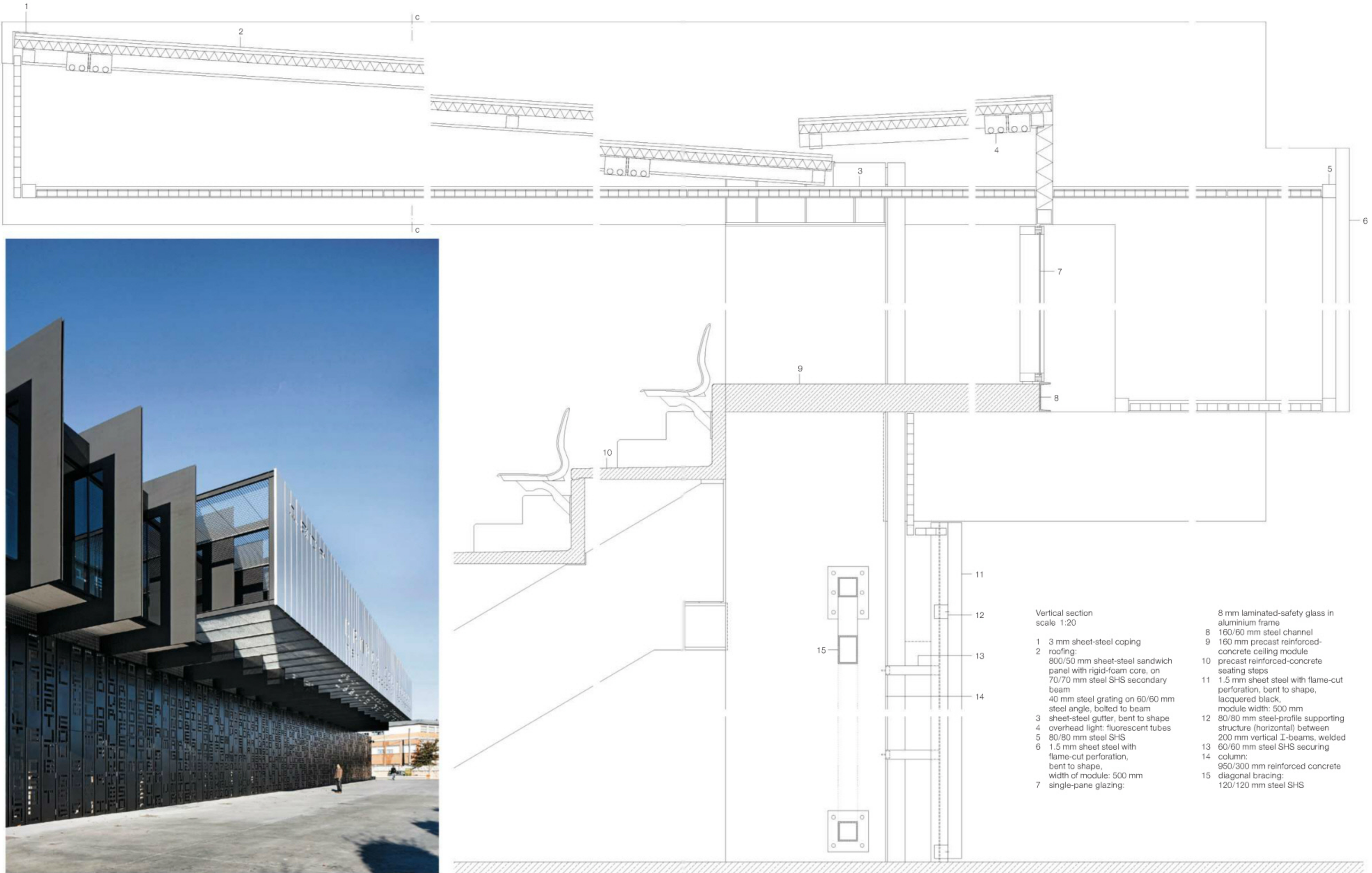


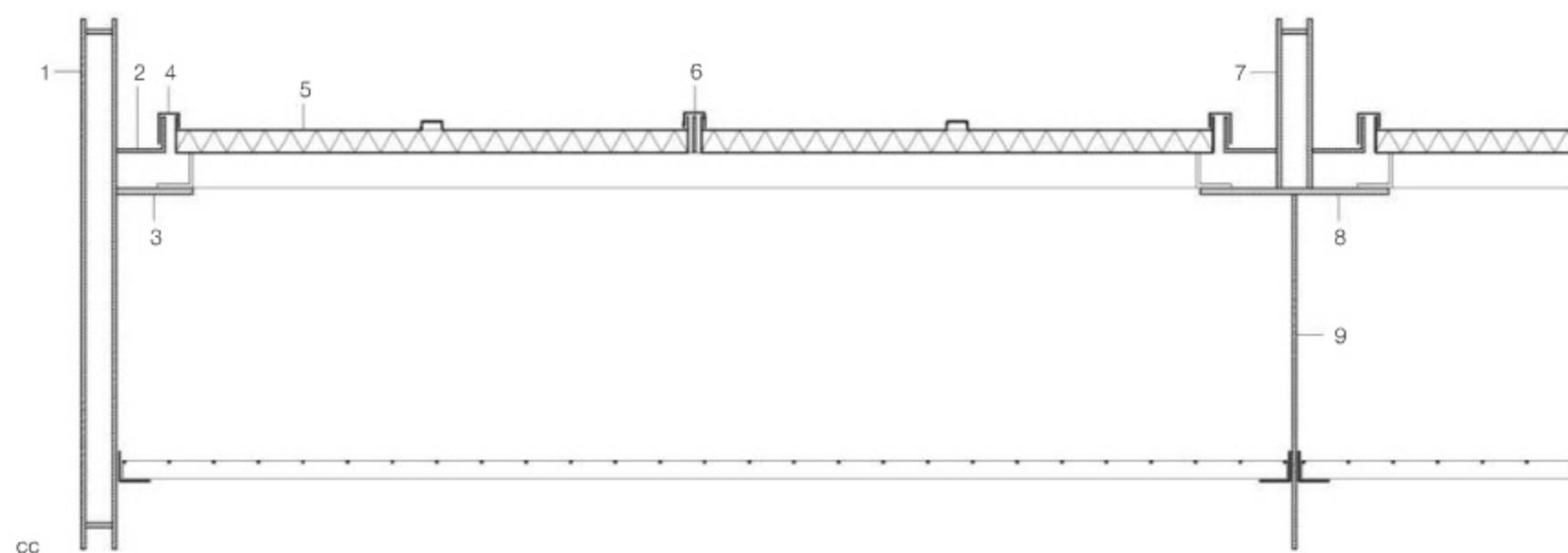
Site plan
scale 1:5000
Sections • Layout plan
scale 1:1000



- 1 Access
- 2 Bar
- 3 Rental space
- 4 Club rooms
- 5 Press centre
- 6 VIP area
- 7 Cloakroom (external)

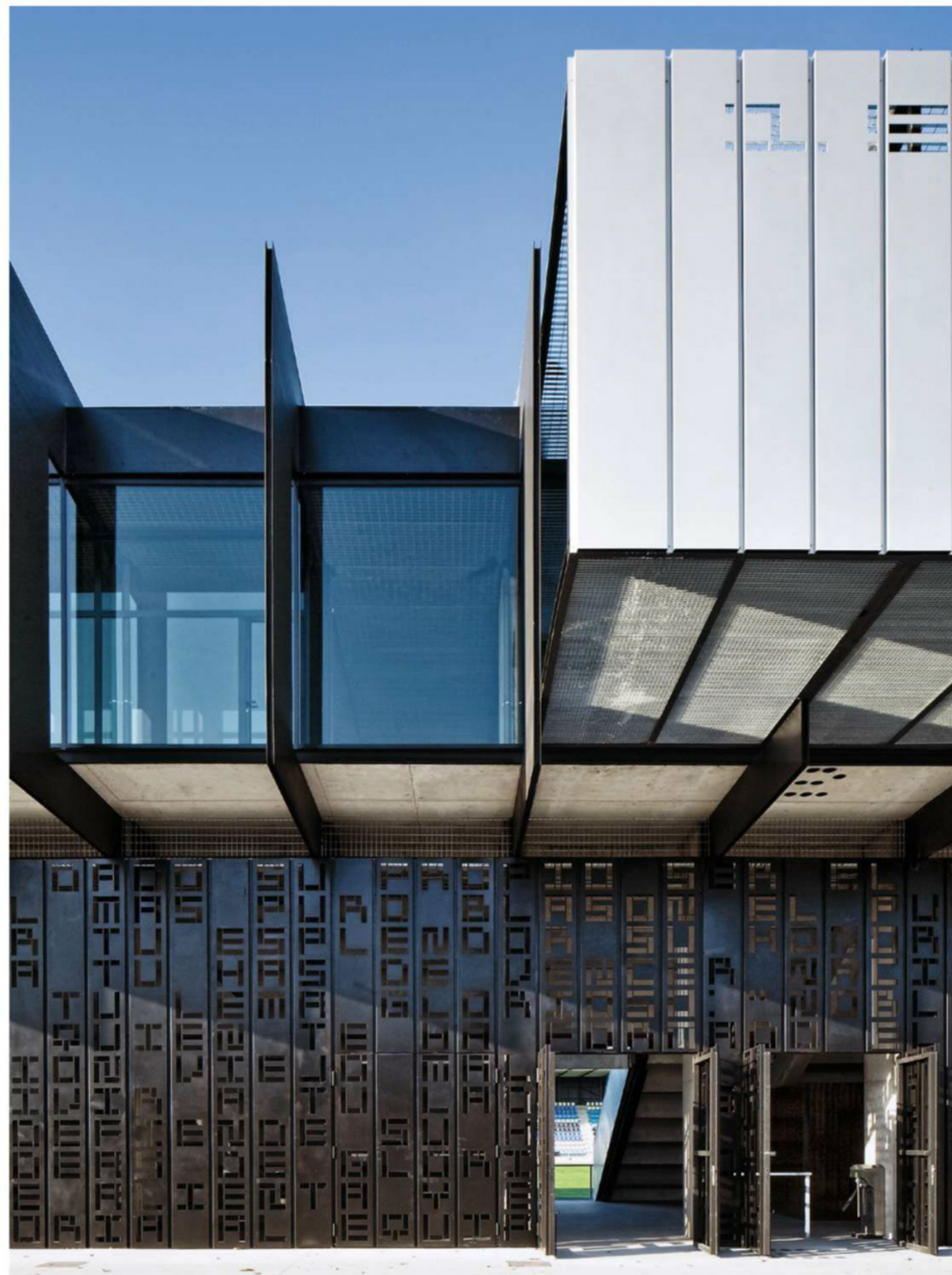






Section
scale 1:20

- | | | |
|--|---|---|
| 1 roof edge beams:
2x 1200/10 mm steel flat and
2x 64/10 mm steel flat | 4 cover:
2 mm sheet steel, bent to shape | 6 60/60 mm steel angle, bolted to beam |
| 2 gutter:
100/4 mm + 80/4 mm steel flat | 5 roofing:
800/50 mm sheet-steel sandwich panel
with rigid-foam core on | 7 primary beam, roof:
2x 900-250/10 mm steel flat and
64/10 mm steel flat |
| 3 bracket:
180/15 mm steel flat, welded,
lacquered black | 70/70 mm steel SHS
secondary beam | 8 bracket:
420/15 mm steel flat |
| | 40 mm steel grating on | 9 300-850/6 mm steel flat |



Refurbishment and Redesign St. Moritz Parish Church in Augsburg

Architects:

John Pawson, London
Rainer Heuberger, Augsburg
(Construction management)

Team:

Jan Hobel (project architect),
Stefan Dold, Reginald Verspreuwen,
Christine Bickel, Sanam Salek

Structural engineer:

Dr. Schütz Ingenieure, Kempten

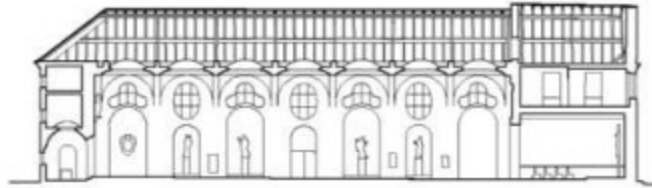
Others involved in the project: see page 109



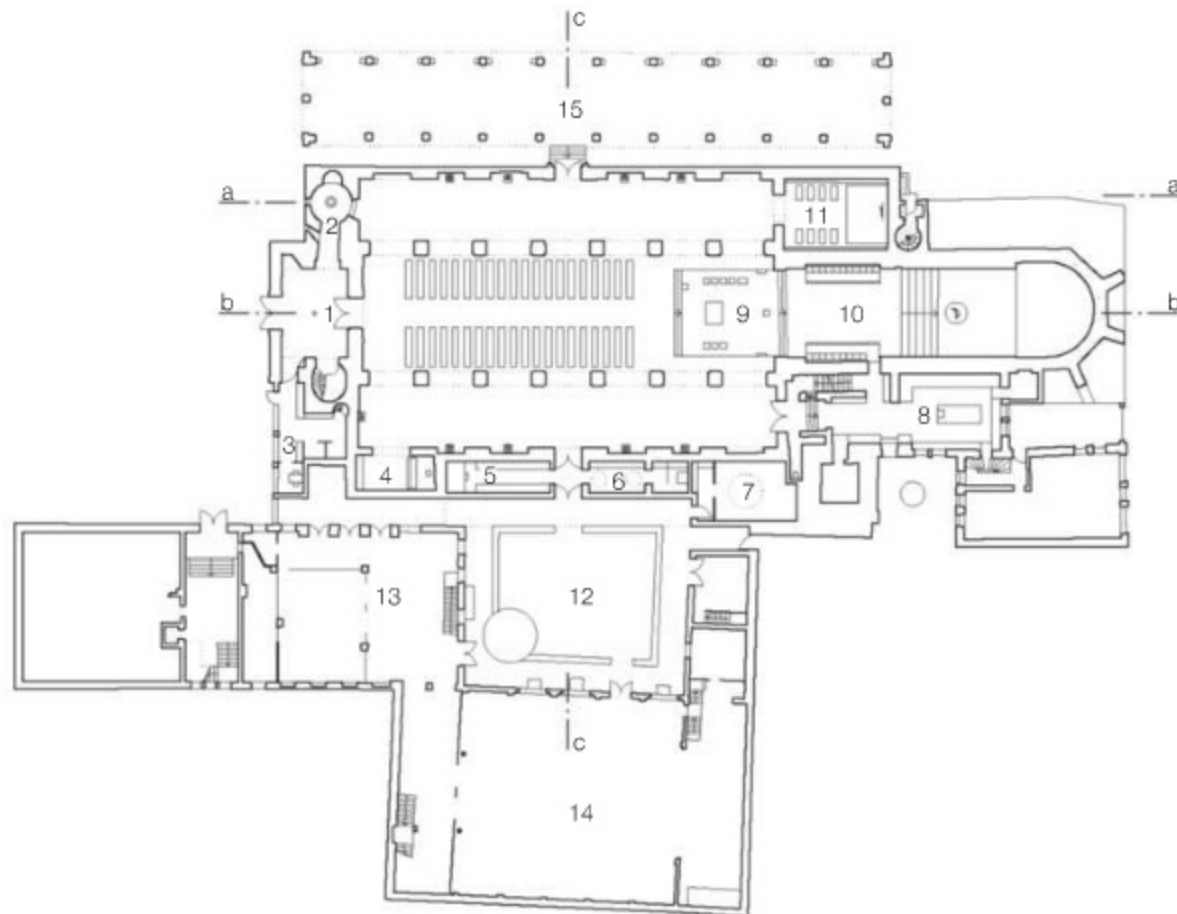
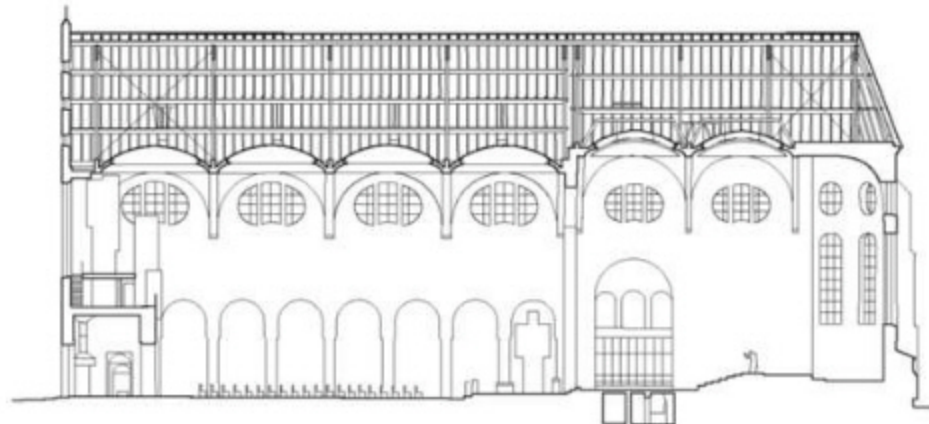
St. Moritz Parish Church was established in what is presently the centre of Augsburg nearly 1000 years ago. It was not an uneventful millennium: following fire and collapse in early years, a Romanesque basilica was erected; later a Gothic choir and vaults were introduced. The building was altered in the course of Reformation and Counter-Reformation and was later lavishly reappointed in the baroque era. Later, Dominikus Böhm directed the rebuilding of the church, which had been damaged during the Second World War; he gave it a modern form. Nevertheless, in this version, as in others, different historical periods shine through. Following liturgical reform in the 1960s, however, the consonance was diminished.

John Pawson's purist, redesign of the church interior – a design characterised by clarity and careful choreography of light – marks a new chapter in the church's history. The focus is again on the choir and apse. The daylight penetrating the thin slabs of onyx bathe this space in pale, diffuse light – a symbol of the threshold to transcendence. On a platform in front of the apse, a full-scale Christ the Saviour by Georg Petel, a prominent figure of the baroque era in Augsburg, appears to emerge directly from the

aa



bb



Sections • Layout plan scale 1:800

- 1 Main entrance
- 2 Baptismal chapel
- 3 The Sympathetic Ear (pastoral care, planned)
- 4 Lady Chapel
- 5 Preparation
- 6 Confession chapel
- 7 Meditation space
- 8 Vestry
- 9 Altar
- 10 Choir
- 11 Chapel of the Cross
- 12 Courtyard
- 13 Foyer
- 14 Moritz Hall
- 15 Arcades



cc

apse. Only upon second glance does it become apparent that the shells inserted in the domes above the choir are new elements. The choir stalls are a similar case: their design neither attempts to conjure up the past, nor is it incongruous. The light-filled apse, the platform beneath Christ the Saviour, and the choir stalls embellish the choir; these measures make the depth of the space legible again. The freestanding altar, now positioned in the main nave, moves the liturgy closer to the congregation.

Only a small number of precisely crafted materials were used: aside from the white stucco walls, these include dark-stained oak and Portuguese limestone – with delicate, barely perceptible nuances in, for example, the polish of a surface. The bespoke objects, from steles and benches to ambo and baptismal font, pick up on the material canon and formal vocabulary of the space-defining elements. The refined dramaturgy of light plays an important role in the overall concept. The goal was to attain light conditions reminiscent of a Romanesque basilica, with an especially bright apse to direct attention to the altar and choir. Yet there are no visible luminaires to speak of. Warm and cool shades of white predominate in the LED lighting. Most of the lamps are integrated in the shells; it was possible to make use of extant holes in the domes to illuminate the choir and nave. In addition, floor lamps accentuate the columns and the Christ the Saviour.

In keeping with the architects' concept, more than 90 % of the artwork has remained in the church – but has been repositioned. The surviving baroque apostle figures occupying niches in the side aisles have a particularly strong presence.

One significant new component remains, however, hidden: the sub-floor heating maintains a constant temperature throughout the year, forestalls draughts and – more importantly – condensation, and protects the building as well as the artefacts. The humidity is controlled by means of hydraulically operated windows and carefully positioned vents.

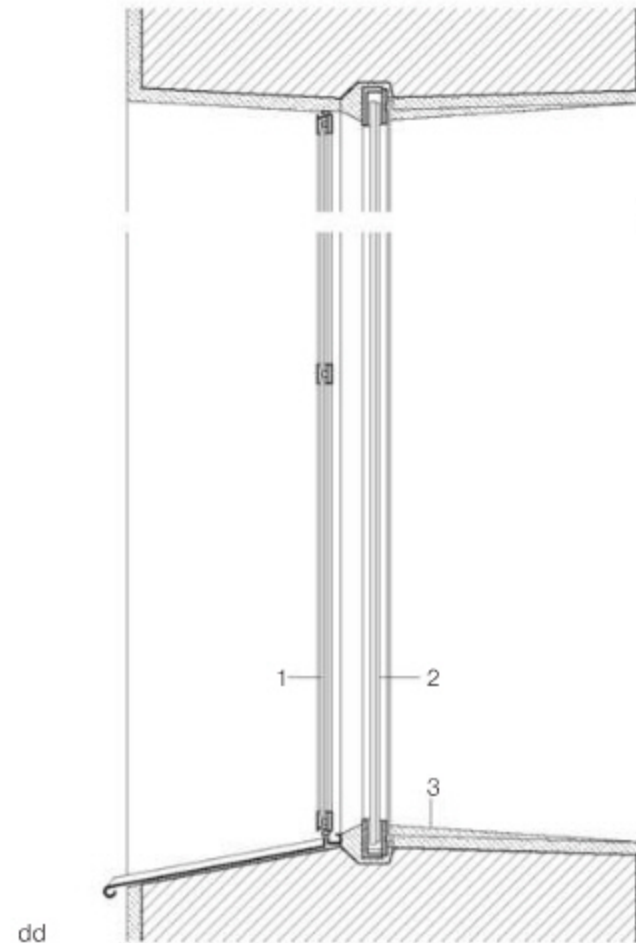




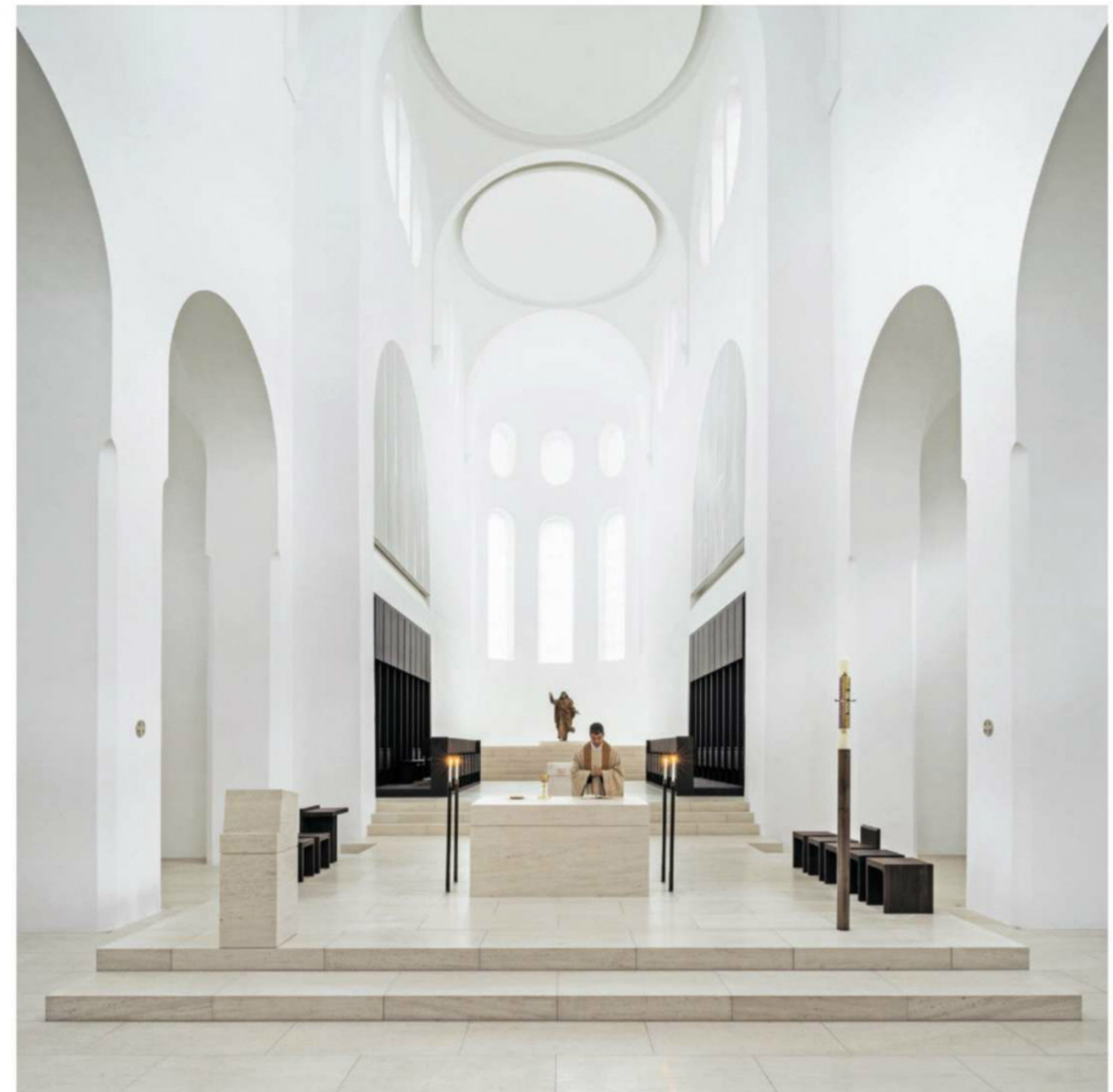
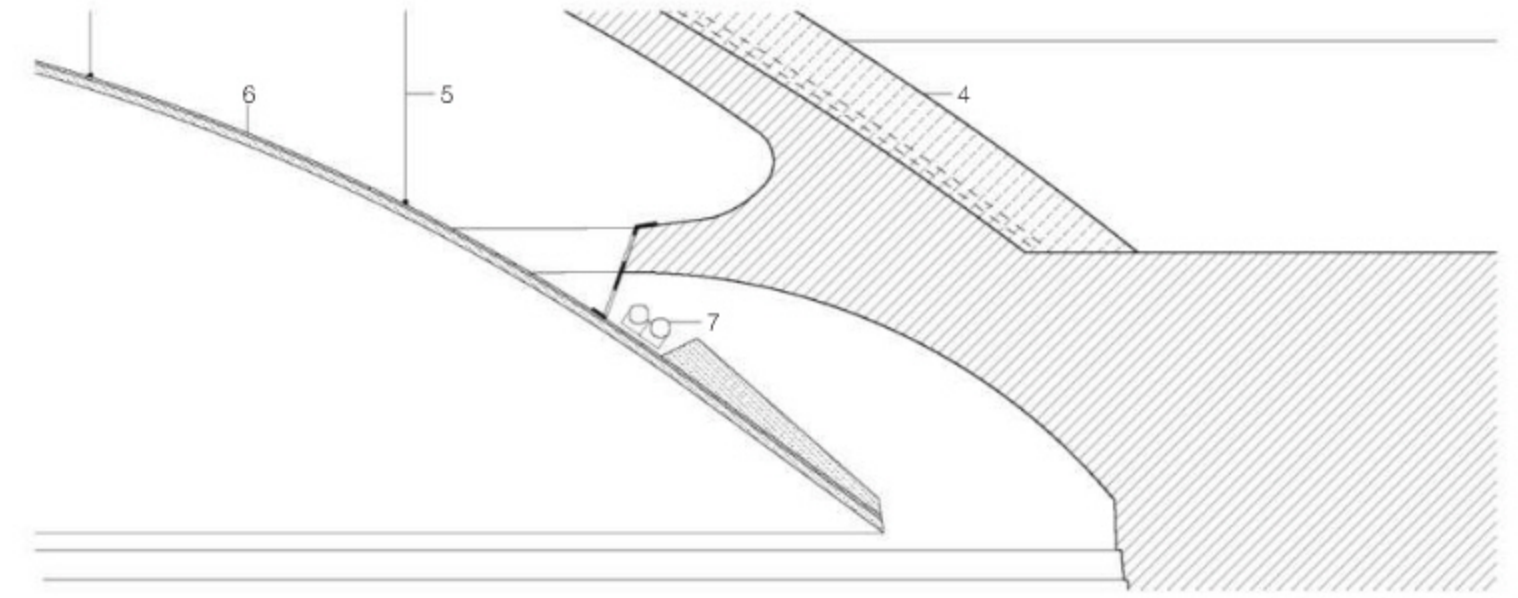
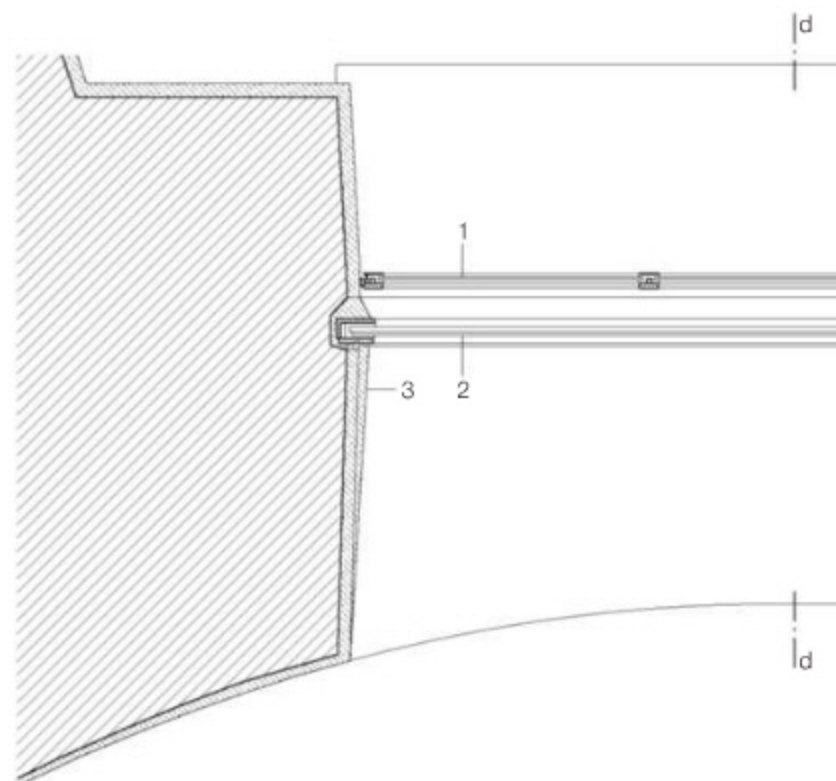
- a baroque (photo pre-1944):
pilasters create connections between
domes and earth, provide rhythm to
the space, and give it depth; perspective
centred on high altar, as a result
choir windows are concealed;
figures und choir stalls in niches
- b War damage, 1944
- c Reconstruction: Dominikus Böhm
("elements were omitted that
detracted from the clarity of the spatial
and structural composition");
figures instead of pilasters as space-
defining elements, voids in place of
original figures destroyed in the course
of the war; the high altar remains at
centre of the perspective;
like in the baroque version, the middle
choir window is concealed; choir and
nave separated by balustrade, floor ma-
terial, level change.

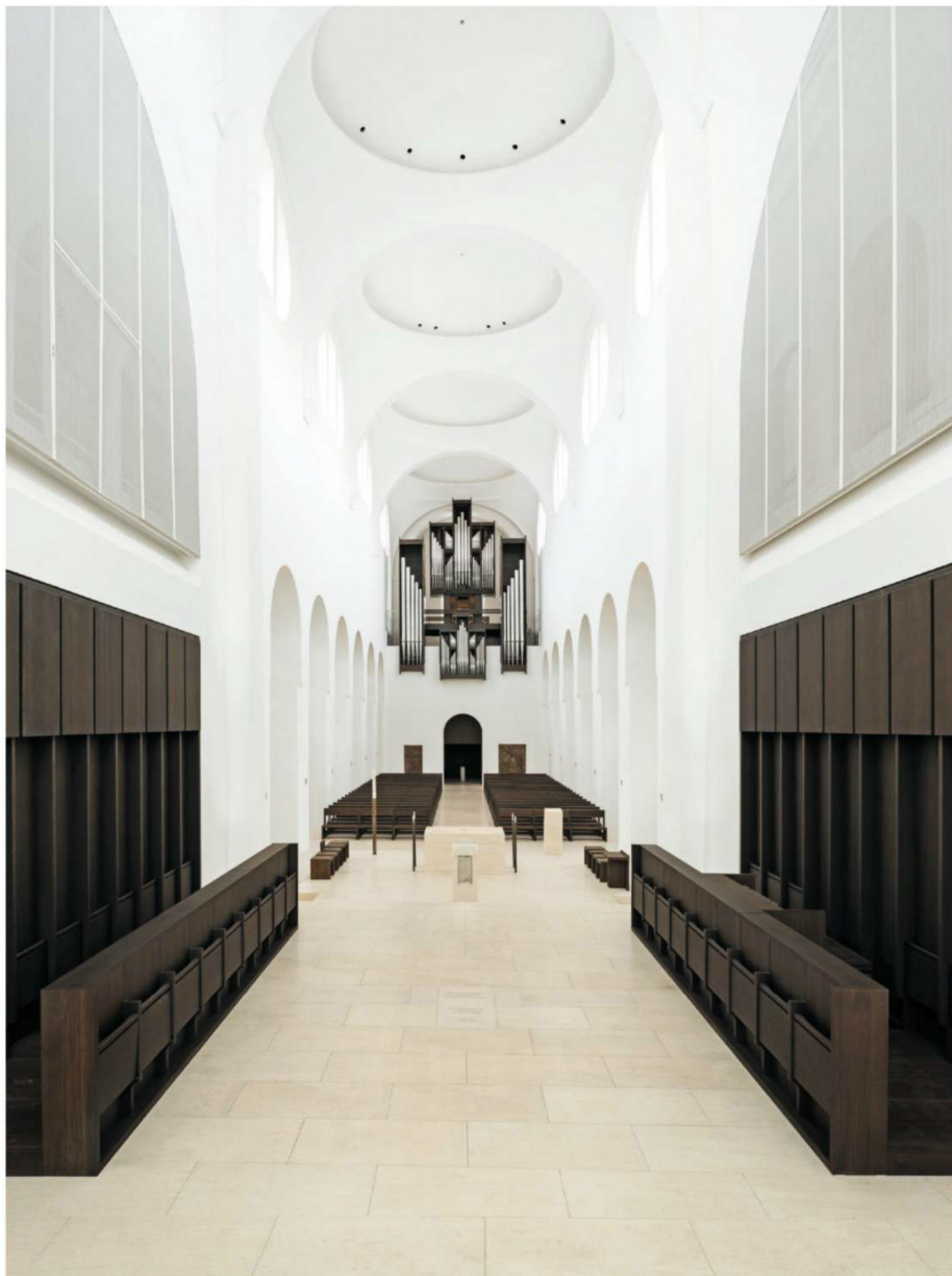
Windows in apse
Dome/Shell at choir
Sections scale 1:20

- 1 outer protective glazing (retained at
behest of preservation agency):
5 mm single-pane float glazing on steel-
flat frame (sealed inside with glazing
tape, not putty; outside with silicone)
- 2 laminated-safety-glass interior glazing
(new): 12 mm low-iron toughened glass
+ 6 mm onyx (affixed to glass)
steel-angle frame / steel-flat glazing
bead, bolted, each hot-dip galvanised/
lacquered, recessed/anchored
in reveal
- 3 stucco surround, up to 30 mm thick
(frame of inner glazing unit embedded
in stucco)
- 4 140 mm concrete (atop existing dome),
reinforced (suspension hooks integrat-
ed in dome shell), upper surface of ex-
isting dome cleaned, roughened
- 5 dry construction, quick mounting with
eyelets, galvanised (l = up to 120 cm),
340 per dome, incorporated in upper
shell
- 6 dome-shaped shell, suspended,
25 mm overall thickness:
structural ring: Ø 8 mm steel bar,
galvanised (4 rings per dome)
Ø 6 mm steel-rod reinforcement mesh,
galvanised, diagonally overlapping,
secured to structural rings
(at ca. 30 cm intervals); rabbit wire
lathing, galvanised, integrated in
diagonal reinforcement; gauged mortar
plaster, fibre-reinforced, embedded in
wire mesh; gauged mortar plaster
finishing plaster (lime mortar) felled and
lime-washed
- 7 indirect LED lighting, two rows
(warm white, cool white),
dimmmable



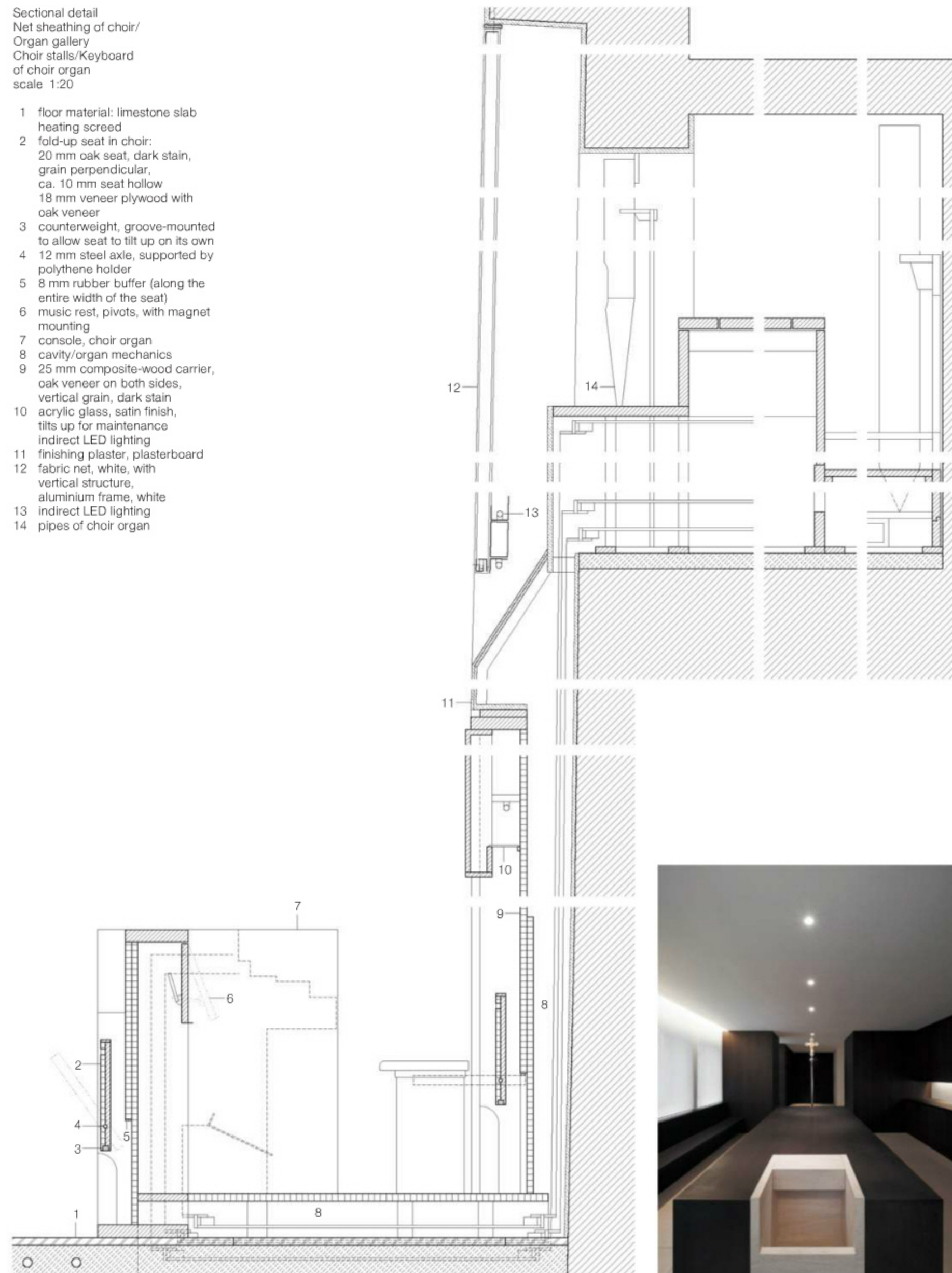
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Sectional detail
 Net sheathing of choir/
 Organ gallery
 Choir stalls/Keyboard
 of choir organ
 scale 1:20

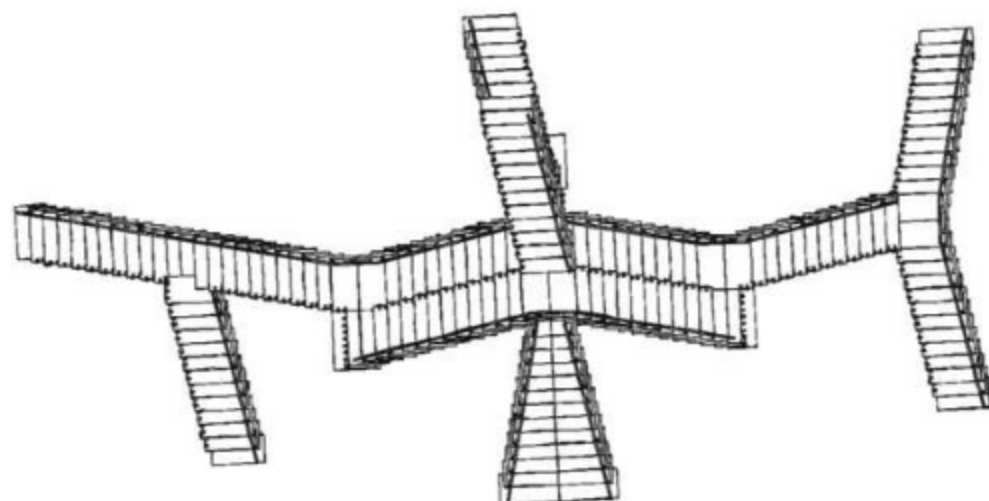
- 1 floor material: limestone slab
heating screed
- 2 fold-up seat in choir:
20 mm oak seat, dark stain,
grain perpendicular,
ca. 10 mm seat hollow
18 mm veneer plywood with
oak veneer
- 3 counterweight, groove-mounted
to allow seat to tilt up on its own
- 4 12 mm steel axle, supported by
polythene holder
- 5 8 mm rubber buffer (along the
entire width of the seat)
- 6 music rest, pivots, with magnet
mounting
- 7 console, choir organ
- 8 cavity/organ mechanics
- 9 25 mm composite-wood carrier,
oak veneer on both sides,
vertical grain, dark stain
- 10 acrylic glass, satin finish,
tilts up for maintenance
indirect LED lighting
- 11 finishing plaster, plasterboard
- 12 fabric net, white, with
vertical structure,
aluminium frame, white
- 13 indirect LED lighting
- 14 pipes of choir organ





Technology

Endless Stair – USA, Italy, Switzerland, Great Britain – The Origination Process of a Sculptural Installation



A

As part of the London Design Festival 2013, the Endless Stair was on display on a prominent site between the Thames and Tate Modern. Visitors had the opportunity to enjoy the view of the river and of the urban silhouette on six landings at different levels. The sculpture's different components had already travelled around the world and been developed in a fascinating process before it was opened to visitors on the lawn in front of the Tate Modern. This year, the London Design Festival and the American Hardwood Export Council (AHEC) commissioned dRMM Architects in London to design a sculpture. The AHEC is currently fostering the use of fast-growing American tulipwood

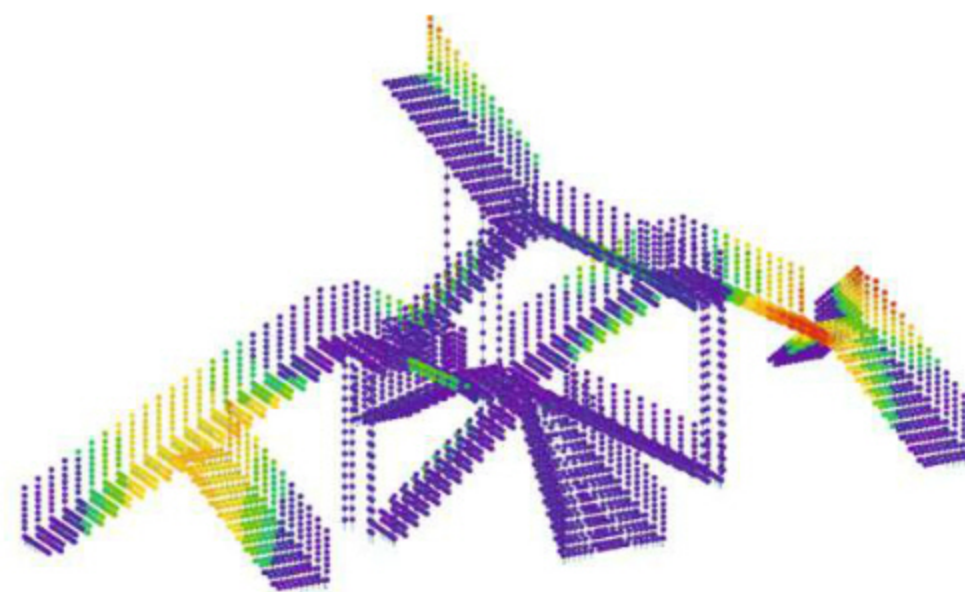
(*Liriodendron tulipifera*), not only for furniture, but also in architecture, and has been present at the festival in recent years (2008 Pavilion by David Adjaye, 2011 Timber Wave by AL_A Architects). Unprocessed tulipwood was shipped from the USA to Imola Legno in Italy, where the cross-laminated timber boards used in the structure were produced. Fine Swiss craftsmanship was needed for the realisation; therefore the voyage continued to Nüssli in Hüttwilen. From there it was transported to London by lorry, where the prefabricated elements were assembled. Although it travelled a considerable distance, thanks to wood's low-carbon properties, the result of the life-cycle as-

essment, by PE International, was favourable (14.5 tonnes of CO₂ are stored in the structure).

Design – dRMM Architects, London
Inspired by the drawings of Dutch artist Maurits Cornelis Escher and the crown of the tulip tree, the firm arrived at a three-dimensional installation that spirals up into the firmament. Although there is a visual culmination, the association with infinity is justified. The installation is readily adaptable and can be reassembled in countless reconfigurations and contexts. When faced with a design problem with a pre-determined material (cross-laminated timber ele-



B



C

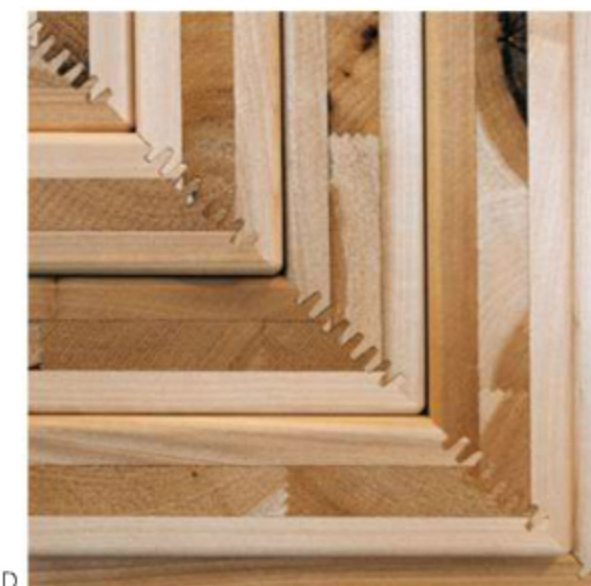
ments with a thickness 60 mm) and the site in front of the Tate Modern, dRMM Architects Alex de Rijke and Jonas Lencer immediately thought of a stair installation. The intention was to provide a good view of the river and of the city, but the design also took cues from the wider significance of stairs as places to linger and interact, and from the fact that stairs are often a focus in urban spaces. The form of the stair will vary according to the context and sightlines, and in this way gives a glimpse of the complexity of the seemingly simple structure.

Structural concept – Arup, London
Structurally, the Endless Stair served as prototypical project to investigate the use of hardwoods – in place of the standard softwoods – in cross-laminated timber (CLT). The process began with a series of materials tests at Trento University in Italy, where the rolling shear properties of tulipwood elements were studied. The results showed that these elements are more than three times as strong and significantly stiffer than comparable elements of softwood. In contrast to softwood, hardwood boards are only available in widely diverging widths and lengths (9.5 to 35.0 cm wide and 180 to 480 cm long), which impedes conventional processing. In the case of the Endless Stair, to attain uniform dimensions, the boards were glued together with a heavy-duty epoxy adhesive. These elements (1135 x 560 mm) were then glued together in three layers, with the central one lying at 90°, resulting in CLT. Standardised PU adhesives (in place of epoxy) are also conceivable; in this case, owing to its weather-resistance and good drying characteristics, an epoxy adhesive was used. The sculptural installation's structural conception satisfies the demands of a loading situation that is difficult to control due to the large number of visitors (as many as 100 at a time) and restricts movements to an acceptable level (less than 20 mm) without infringing upon the sculptural aesthetic. The demands made of a temporary structure are more critical than of one with a more con-

sistent, permanent use. The design loads are based on observations of how people move on crowded escalators: normally there is one person on every other stair (2 kN/m²), but for the Endless Stair, that amount was doubled locally on individual flights to take loads into account that arise when members of a group stop close to each other to take photos or enjoy the view. In the analysis, all of the structural forces that arise in connection with standard load parts were determined and then tested with respect to additional non-linear forces that arise due to the flexibility of the structure and the deflection (bending) of the elements. A representative trial flight of stairs was erected in Switzerland and subjected to loads to reconcile the theoretical analysis with the actual construction, control stress forces, and fine-tune the construction. The analysis demonstrated that the structure as executed had more favourable properties than had been forecast in the original analysis, because the calculation of the presumed properties and the unknown factors in the complex structure had been undertaken cautiously.

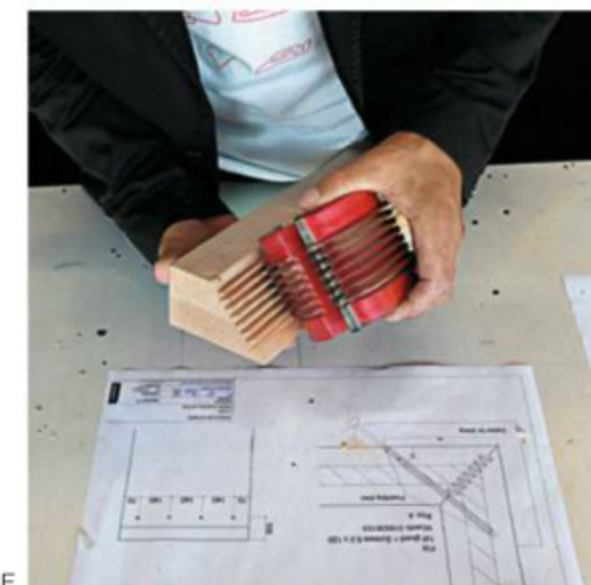
The structural system is relatively simple. The flights function similarly to stacked arching elements that support one another, with incidental compression loads that are directed from the solid-timber balustrade and then from one step to the next, and finally into the ground. Therefore the connections within the flights must withstand quite large stresses. Moreover, the connection details were developed to facilitate setting up the sculpture a short time before the scheduled opening, as well as easy disassembly and subsequent reuse of the individual components. All 15 flights were prefabricated off site and were connected to the balustrades on site using tension rods and screws in predrilled holes.

Production – Nüssli, Hüttwilen
During both the preliminary phase and the realisation phases the meetings in Hüttwilen and London played an essential role. In these meetings Nüssli – in cooperation with the clients, the architects, the engineers,



D

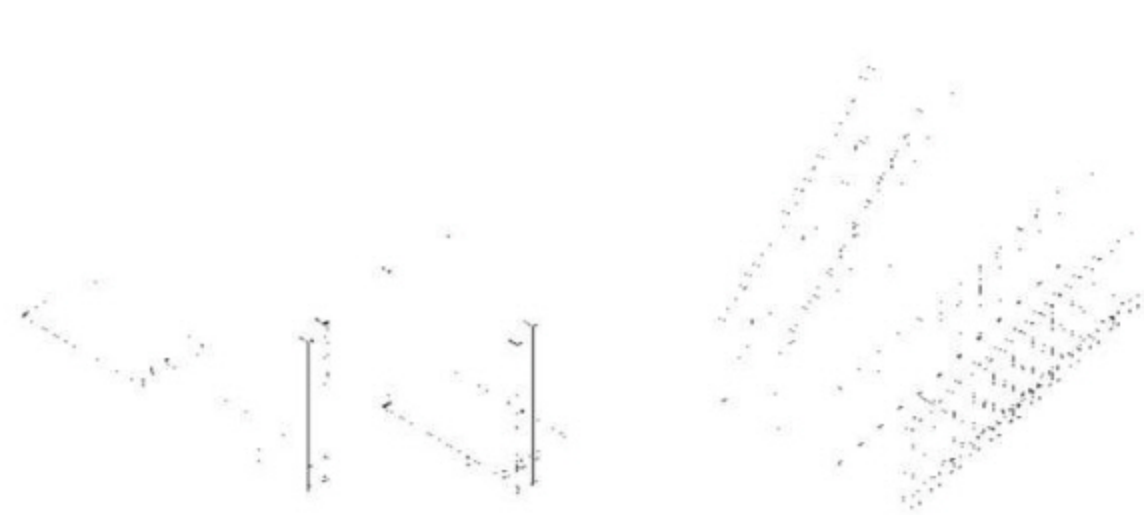
and the producers of the laminated wood – defined all of the key data for the planning, management and fabrication of the design. The content of the meetings: coordinating planning, project management, and on-site operations and logistics. The treads and the balustrade of the L-shaped elements were constructed in the three-layer panels (1120 x 560 x 60 mm). Holes and grooves for the connections, as well as mitres and special cut outs were made at the CNC mill. To prepare for the work to be done by the CNC mill, Nüssli made drawings for about thirty distinct types. One aspect that made the calculations for the sculptural installation difficult



E



F

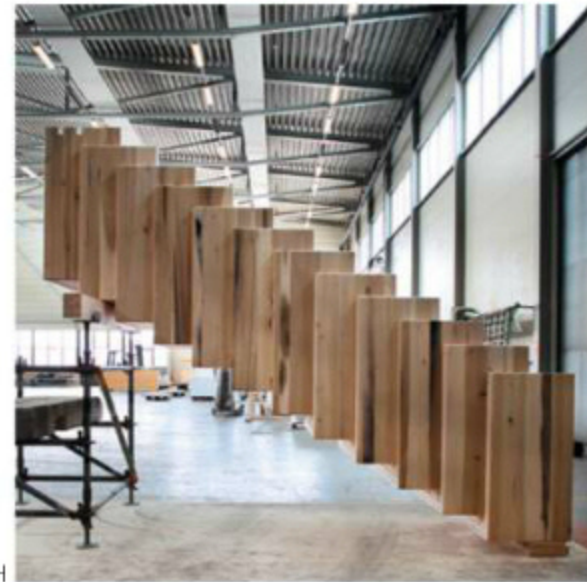


G

was the high leverage ratio between the length of the gluing surface of the tread-balustrade connection to width of the tread (85 mm to 1120 mm) produced a large load. The surface area available for gluing in a normal mitre connection would not have withstood the expected stresses. The solution was to employ a finger-joint connection to increase the area of the gluing surface: the surface increased from 475 cm² without special milling to 1126 cm² with special milling and thereby attained a working strength factor of 2.37. In addition, the connection was reinforced with four fully threaded screws, which, as compared to normal screws, make it more elaborate, but much more stable and increase the push-through and pull-out strength. By simultaneously employing six sets of falsework, Nüssli was able to reduce the pressing time of the L-shaped connection to 90 minutes. Then the elements were pre-drilled with the assistance of a metal template at an angle of 45° and equipped with

fully threaded screws.

The treads and balustrade making up the L-shaped laminated element had to be connected both horizontally and vertically. This required high-precision positioning, and this part of the process also had to be as efficient as possible. Concealed suspension fittings initially appeared a sensible means for the vertical connections. Several promising versions were executable, but the cost of the hardware and the assembly turned out to be prohibitive. Consequently, arriving at a practicable solution required the development of connection details. As a complement to the 0.53 m² gluing surface, a simple tongue-and-groove connection in the panel surface for positioning, combined with full-thread bolts to transfer forces, turned out to be affordable and feasible. It was also necessary to guarantee precise positioning of the horizontal connection of the L-shaped elements. Furthermore, they had to be compatible with the vertical connection and able to withstand similar loads.



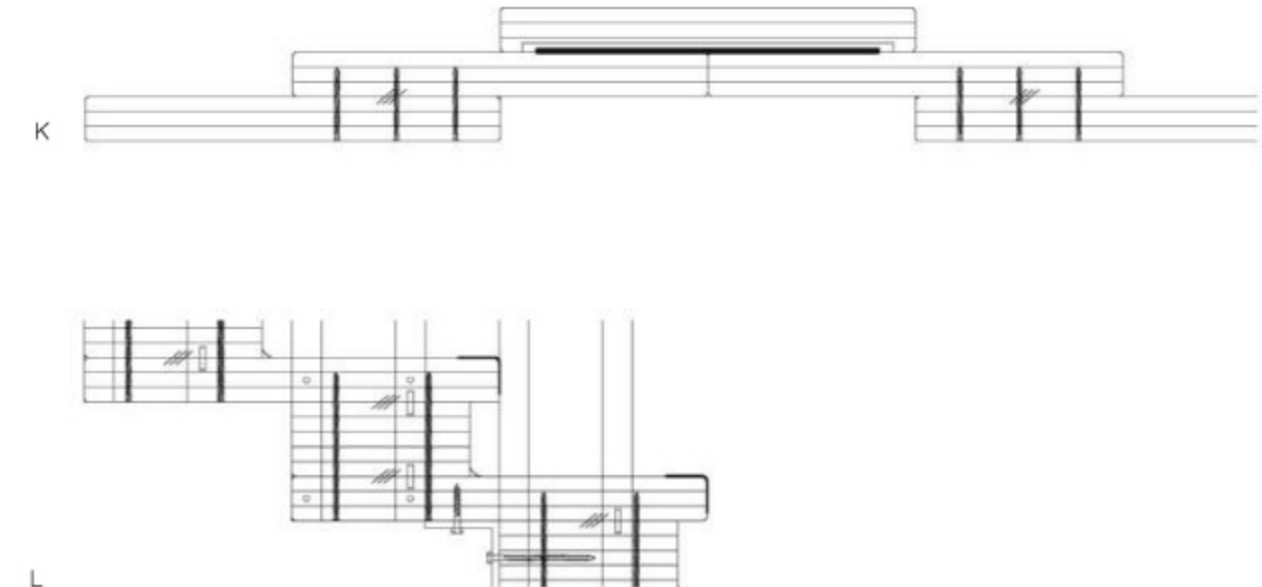
H

The calculations concluded that the loads are strongly dependent on the location of the steps. As programme was tight, the loading conditions of each and every step element were calculated by Arup to allow Nüssli to optimise the number of screws and thereby also the amount of work required to program the CNC mill. To minimise the work necessary for the preparation process, the number of screw layouts was rationalised down from nearly 160 to only five types. The different screw layouts that came about had between 14 and 30 fully threaded screws for the respective loads.

The gluing surface is 2x 0.18 m² and here, too, a tongue-and-groove connection in the surface of the panels aids the positioning. To align the heights and transfer loads, an infill block made of five-layer glue-laminated boards extends across 3/4 of the stair width (instead of the initial proposal in which the blocks were placed at intervals), and connects the adjacent treads. The elements between the treads were cut to size (750 x 240 x 100 mm) and, using the CNC mill, through holes were drilled on both sides to guarantee the precision. Using the blocks to put the tread-and-balustrade elements together as complete flights was the most elaborate part of the process, because nearly all of the flights vary in form. In the process, 20 kg of glue and ca. 6,000 fully threaded screws were used.

Regarding connecting the flights of stairs to one another, a solution was sought that would enable quick and simple assembly in London. In these locations, as well, the loads were high, and the connections could not be tested in advance. For the connection Arup chose threaded rods paired with blocks that adjust the height. Bulldogs (toothed plate) were employed in order to transfer higher shear forces. A further step in the process was to determine the size of the balustrade posts (1280 x 80 x 40 mm) and to make the landings and columns. It was not possible to do justice to the complexity of the sculpture with a single overarching detail, and so a family of customised details were developed. There were a

- A Floor plan of Endless Stair, scale 1:200
- B Completed stair sculpture at the opening of the Design Festival London
- C Loads calculation by Arup
- D Corner connection between solid-wood balustrade and tread
- E Corner connection, milling at Nüssli's production hall
- F Connection of the L-shaped elements at Nüssli's production hall
- G Individual elements of a flight of stairs
- H Flight of stairs pre-assembled in Nüssli's production hall
- J Assembly of the flights in London
- K Connection of balustrade posts
- L Horizontal section scale 1:7,5
- M Vertical section scale 1:7,5
- N Stair sculpture with dancer at the opening of the Design Festival London



L

great variety of test cycles involving the planned details and the production sequences, assembling and loads. Over the course of the testing, the details were further refined, as e.g. during the installation of the balustrades and the anti-slip measures. However, the elaborate sculpture also required some handcraftsmanship and additional treatment: the surfaces were sanded again prior to lacquering, and the glue was applied to certain corner connections using a brush.

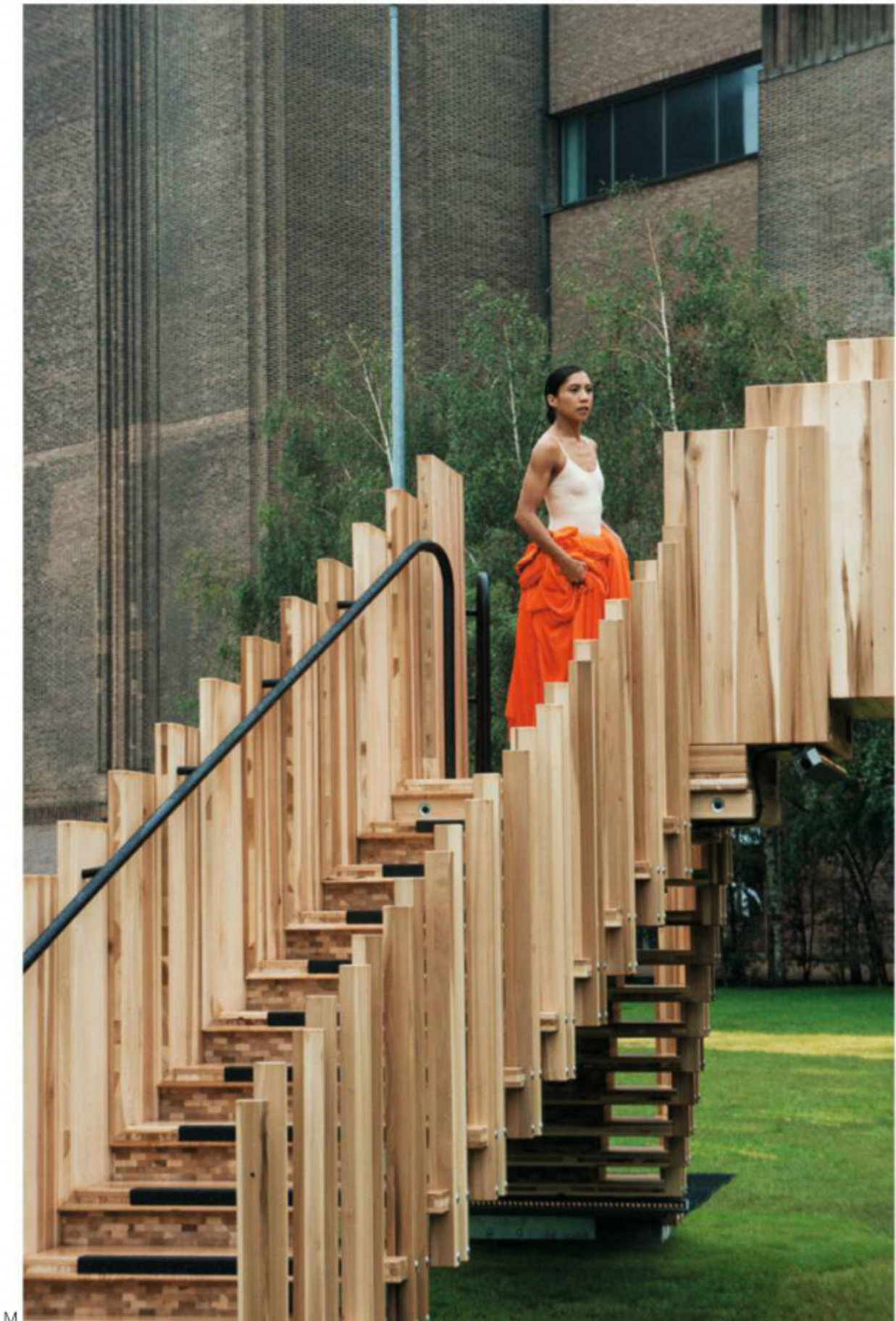
The schedule was so tight that the delivery was made in two phases so that the production in Hüttwilen could begin earlier. In twenty-four hour intervals, three lorries transported the 16 flights of stairs, 400 balustrade posts, 7 columns, concrete base, black handrail elements, crane, scaffolding elements, many special parts and pallet boxes with hardware and tools to London. The assembly adhered to a precise schedule. Scaffolding and flights were set up continuously, adhering to precise instructions.

The complex development and the great amount of work invested in the seemingly simple stair sculpture transcends the temporary character of the construction and must be viewed as an investment in a prototypical experiment with the building material. The response to the sculpture was enthusiastic from the very first day of the London Design Festival; the great number of visitors put it to the test.

Client:
AHEC, London Design Festival
Architects:
dRMM Architects, London
Engineers:
Arup, London
Manufacturer:
Imolalegno, Bologna
Fabricator and Installer:
Nüssli, Switzerland



J



M

MuCEM in Marseille – Diaphanous and Structural Applications of UHPC

Frank Kaltenbach

Others involved in the project: see page 109

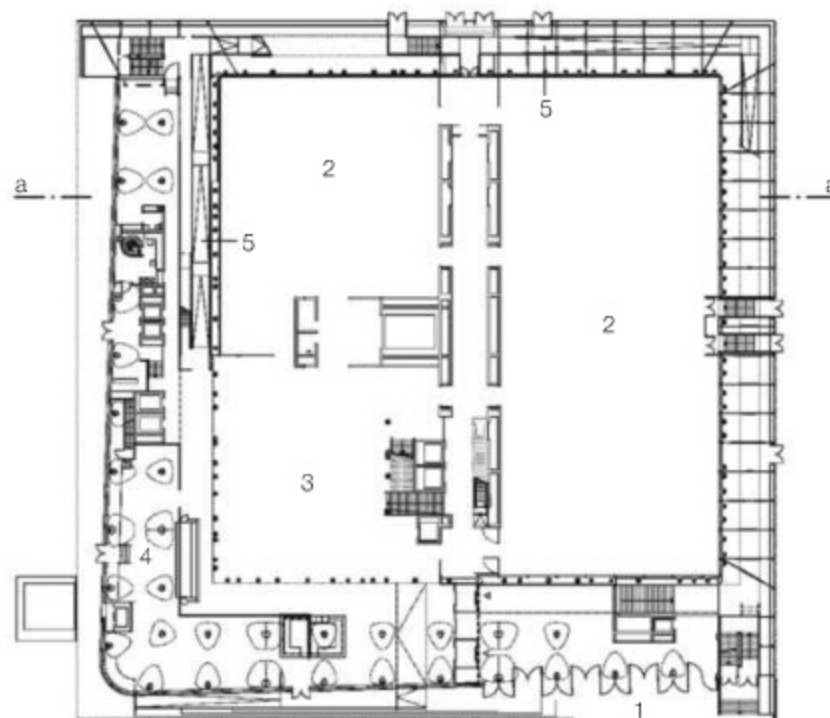
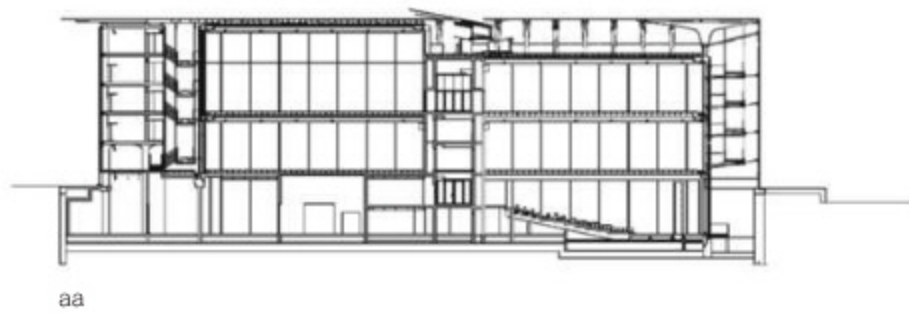
The MuCEM (musée des civilisations de L'Europe et de la Méditerranée) is one of the most interesting buildings in Marseille – which was European Cultural Capital in 2013 (see DETAIL, German Edition 6/2013, page 610) – not just with respect to its architecture, but also to its innovative application of state-of-the-art technology. It is the first building in which ultra high performance concrete (UHPC) has been employed in different applications, both as structural member and as sheathing, on a vast scale. Ricciotti's penchant for experimenting with the material has had a decisive influence on the building's overall composition, which includes:

- a 76 m free-span skywalk with a depth of just 1.80 m
 - a diaphanous building envelope made of 384 self-supporting sun-shading modules; the standard format measures 3000 x 5800 mm, the cross-section of the lattice-work members is only 80 x 70 mm
 - 308 tree columns in which post-tensioning of vertical fibrated-concrete elements is employed for the first time
 - a foot-traffic-bearing surface, only 20 mm in cross-section, of an 820-metre-long suspended ramp, situated between envelope and core.
- Owing to its outstanding physical and chemical properties, UHPC is increasingly

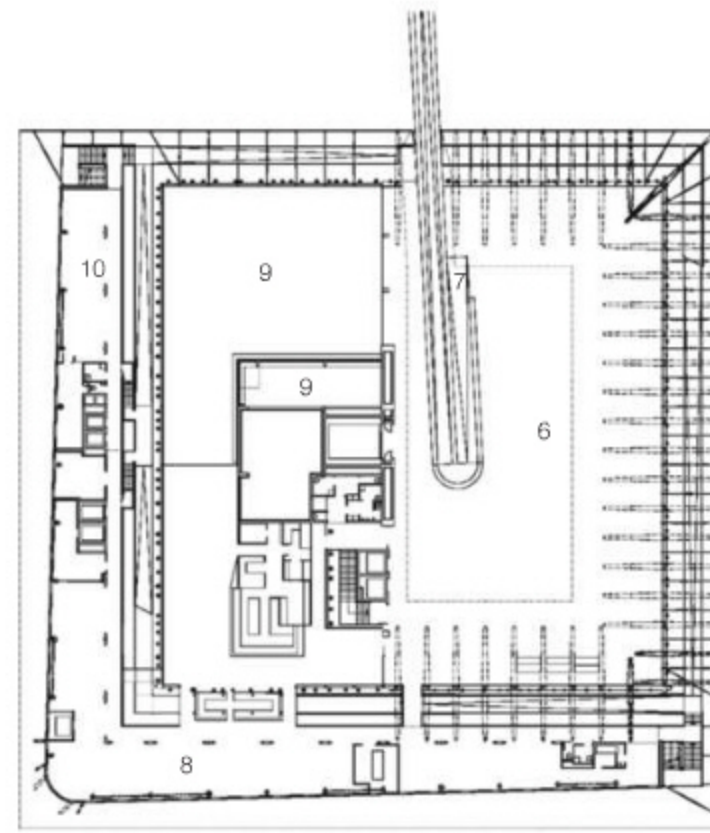
becoming an alternative to conventional structural materials. The forecast of a life expectancy of 100 years makes it considerably more durable than standard concrete; its strength – approaching that of steel – is 6- to 8-fold. In addition, the fine metal or synthetic fibres it contains give it exceptional tensile strength. Thanks to UHPC's closed cell structure, it is airtight and watertight and resistant to aggressive chemicals and salt-water. Fibrated concrete has been in use for twenty years for chemical tanks, sculptures, stair steps, and facade modules. The first pilot projects with the newly developed material as structural member date to 2002 – and were typically pedestrian bridges.



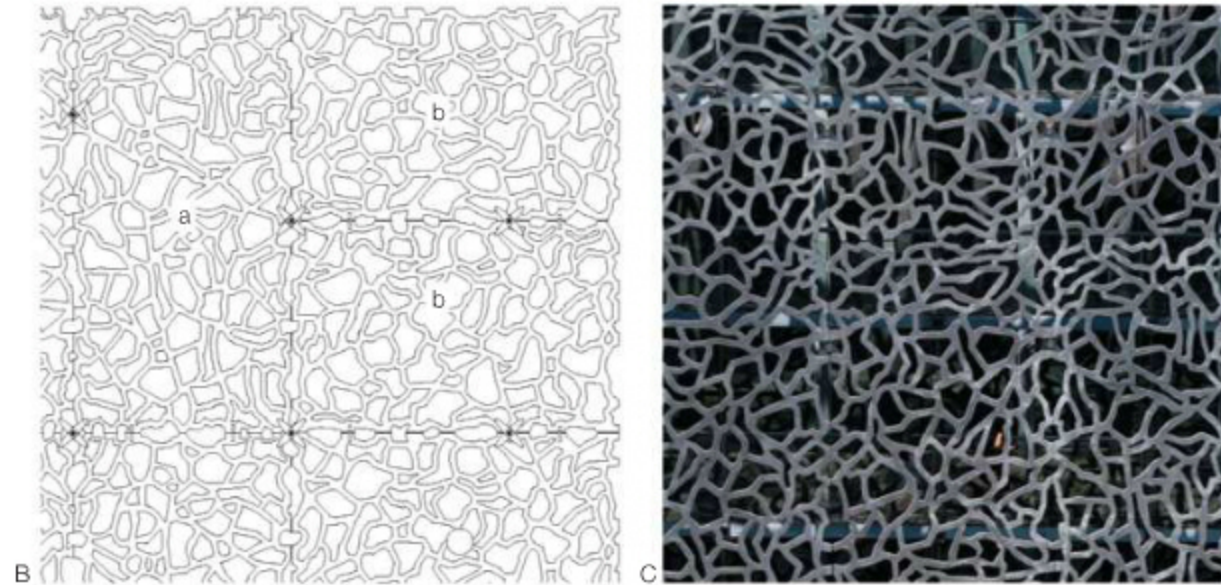
- | | |
|----------------|---------------------|
| 1 Entrance | 6 Roof terrace |
| 2 Exhibition | 7 Pedestrian bridge |
| 3 Café | 8 Restaurant |
| 4 Museum shop | 9 Void |
| 5 Ramp in void | 10 Office |



A Ground floor



Fourth floor / Roof terrace



- A Section • Layout plans, scale 1:1000
 B 30 mm UHPC lattice panel, cross-section 80 x 70 mm
 a standard format 3000 x 5800 mm, pattern in three different versions
 b special format for edge 2900 x 4500 mm, pattern in two different versions
 C Elevation of standard lattice-panel formats
 D Museum with connection to Fort Saint-Jean

It turns out that UHPC does open up possibilities: the material can be compacted to an unusually high degree so that the edges are more crisp and profiles more slender than in standard concrete. It is possible, for example, to cast grilles with intricate patterns as solar protection.

Man-made stone between port and sea
 On a spit of land, the new museum marks the entrance to Vieux Port. The latticework that sheathes the new structure makes reference to the monolithic walls of Fort Saint-Jean; the new pedestrian bridge connects the two (ill. D). The exhibition area is situated in the 19-metre-high volume.

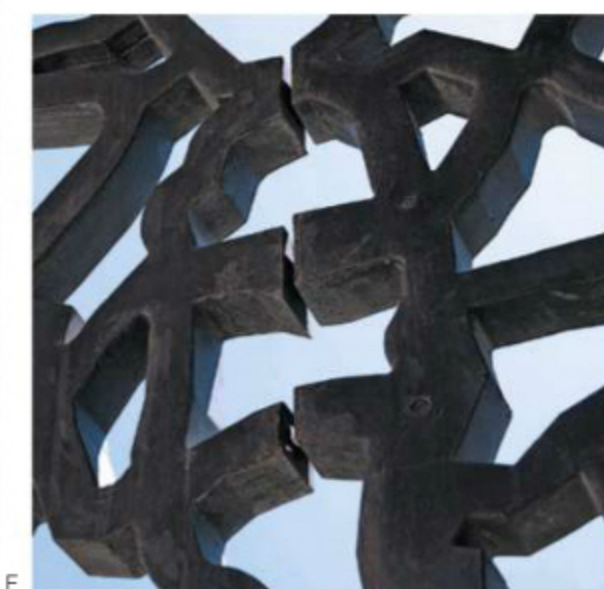
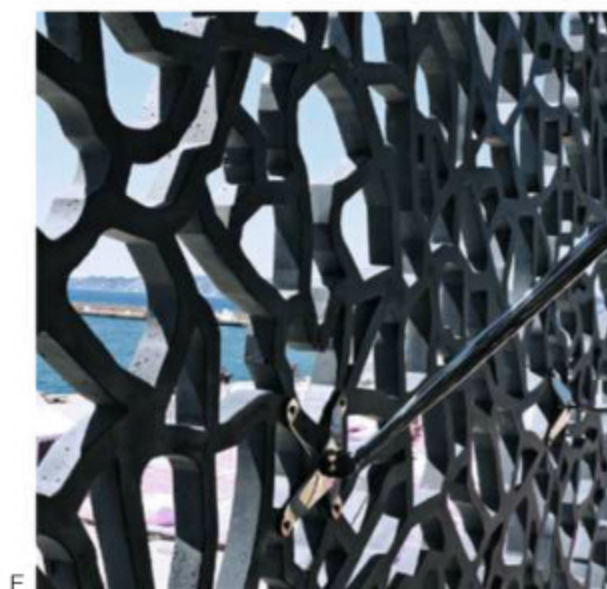
The sides of the outermost shell of the square floor plan measure 72 metres; those of the glass cube within it 52 metres (ill. A). In response to the climatic conditions, Architect Rudy Ricciotti developed a concept with a strong contrast between the broad monolithic-seeming building massing and the lacy veil sheathing it. On the interior, where one's eyes are directed across the Mediterranean toward North Africa, the animated play of light and shadow on the floors and walls is reminiscent of the effect of sunshine on the water's surface (ill. G). Associations with Masharabiya (wood or stone grilles with geometric ornamentation in Arabic cultures) are deliberate: the exhi-

bitations are dedicated to the rich cultural history of the countries bordering the Mediterranean. This transparent skin serves as sun protection. It is hung in front of the glazed cube where the solar radiation is strongest – at the south and west facades, and above the roof surface. The main entrance is on the north at ground level. This is where the promenade begins: as the visitor walks up the ramps, which call to mind a ziggurat in ancient Mesopotamia, he or she passes between the exhibition spaces and the delicate latticework. The sensual experience had while moving through this interstitial space – a space between realms – is



D

- E Point-fixed facade with stainless-steel strut as horizontal bracing
 F UHPC lattice panel with vertical joint
 G Roof terrace with lattice roof
 H, K Pedestrian bridge erected of UHPC beams, overall length: 115 m, span: 76 m
 J Section through pedestrian bridge scale 1:50



reinforced by the tree columns superimposed on the glazed facades' orthogonal grid (ills. M, R). At the end of the ramp is the lofty roof terrace with café.

Pedestrian bridge, seemingly cast in one pour
 In a bold gesture, the slender 115-metre-long skywalk spans from the roof terrace to Fort Saint-Jean, where additional museum departments are located. The far more dramatic access route to the building, however, is had by walking in the opposite direction, when one passes from the ambience of the historic fortress's stone masonry and enters the realm of artificial stone (ill. H). The seemingly monolithic

bridge is made up of two beams that also serve as its railings. The depth of the beams (1.80 m) was determined by the structural requirements of a 76-metre span. Twenty-five 4.50-metre-long pre-fabricated segments are strung on a cable like a chain of pearls; the subsequent post-tensioning transforms them into a homogeneous structure. The precision of the contact area between the segments is crucial. The admissible tolerance is 0.1 mm, or 0.1 °C (ills. H–K). Rudy Ricciotti is one of the first architects to use UHPC for structural members in engineering projects. His pioneering design for the SEYOU pedestrian bridge in Seoul was realized in 2002: the 120-metre arched-span

bridge has received worldwide acclaim. The Passarelle du Diable, a bridge over the Hérault ravine he designed three years later, is, both in terms of design and materials technology, the forerunner of the MuCEM skywalk.

Geometry of the modular columns

The three exhibition levels are lined by a total of 308 precast tree columns in different shapes (ill. Q). They can be classified in three categories: straight columns with parallel or tapering form; Y-shaped columns (9 types); and N-shaped columns (2 types). These parts can also be inverted, doubling the number of variations (ill. T). The col-



umns' heights vary, depending on the storey: 2.79 m, 5.51 m, 6.12 m, and 8.79 m, with diameters of either 25 or 40 cm.

Load-testing the prototypes

A total of eleven separate admissibility procedures involving the so-called Atex (experimental technical) tests, were required in order to gain approval to erect the innovative building. The building specifications were an important tool to ensure that a number of contractors would be eligible to bid. The decisive factor thereby was whether all three fibrated-concrete products available on the market (Ductal by Lafarge, BSI by Eiffage, and BCV by Vicat) could withstand the anticipated loads, as well as stresses caused by fire.

The testers made prototype casts of the Y-columns using all three types of concrete and tested their ultimate strength. To evaluate the behaviour and deformation caused by fire, the entire length of one side of each column was exposed to a temperature of 1000 °C for 1.5 hours; on the other side of each column, a temperature of 20 °C was maintained.

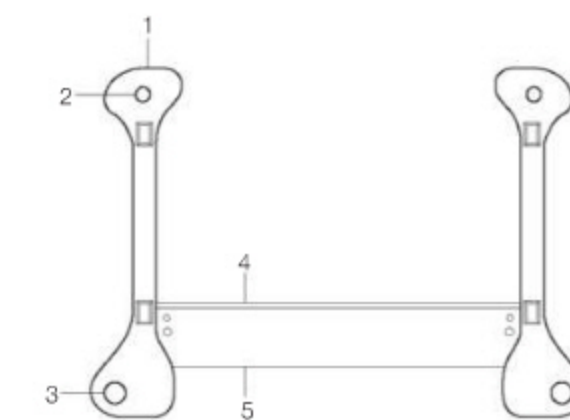
Formwork and mounting

Each type of precast unit requires custom-made formwork. First a carpenter produces the desired form in wood (ill. S; upper left). A negative form – the final concrete formwork – is made of glass-fibre-reinforced plastic from this wooden master mould (ill. S; right side). Conduit is placed in the formwork; later it will hold the post-tensioning cables. In contrast to conventional concrete, no unstressed reinforcement is used in UHPC. To counteract its extreme brittleness and to increase its tensile strength, metal and polypropylene fibres are included in the casting mix. The mix is poured into the upright form so that the force of gravity causes the fibres to align themselves with the direction of the stresses.

Post-tensioning the facade bottom to top

While the form of the columns – particularly the diagonal branches – provides stiffening

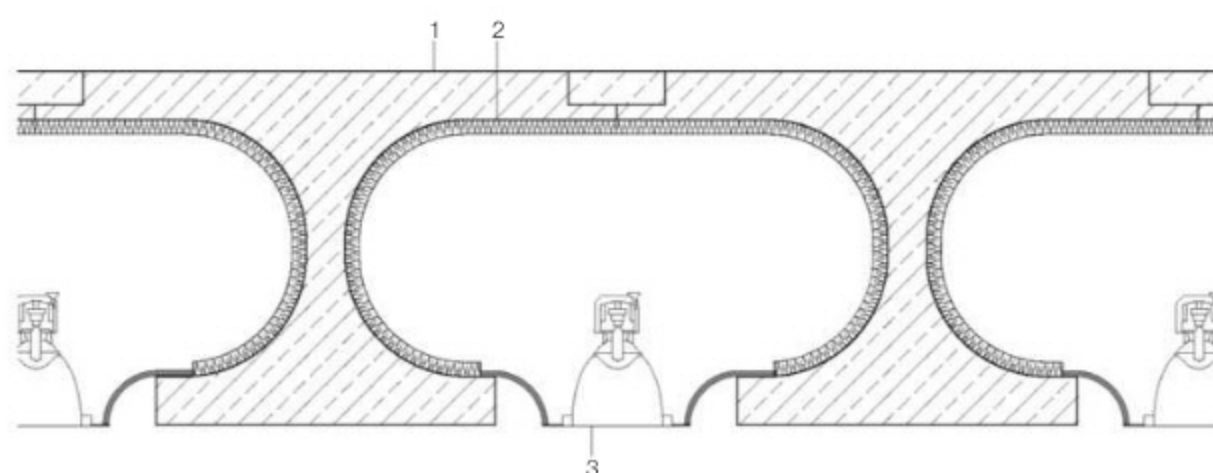
- 1 UHPC beam segment, height 1.80 m, length 4.50 m
- 2 Duct for tension cable (Ø 67 mm) in upper chord
- 3 Duct for tension cable (Ø 127 mm) in lower chord
- 4 25 mm UHPC panel with integrated diagonal bracing
- 5 UHPC beam for horizontal bracing, monolithic bond to primary beams



in the plane of the facade, when eccentric loads are applied, they will buckle perpendicularly to it. The columns were post-tensioned to control this phenomenon. In an initial structural concept, each column was to be post-tensioned – one storey at a time – individually. To that end, entry and exit ports were to be incorporated at the base and top of each column, as well as above and below the adjoining edge beams. However, to comply with earthquake-safety measures enacted in 2011, the team developed a solution in which the post-tensioning occurs via cables that run from basement to roof – through three levels of columns (ill. P). The brackets at the base and top of the columns

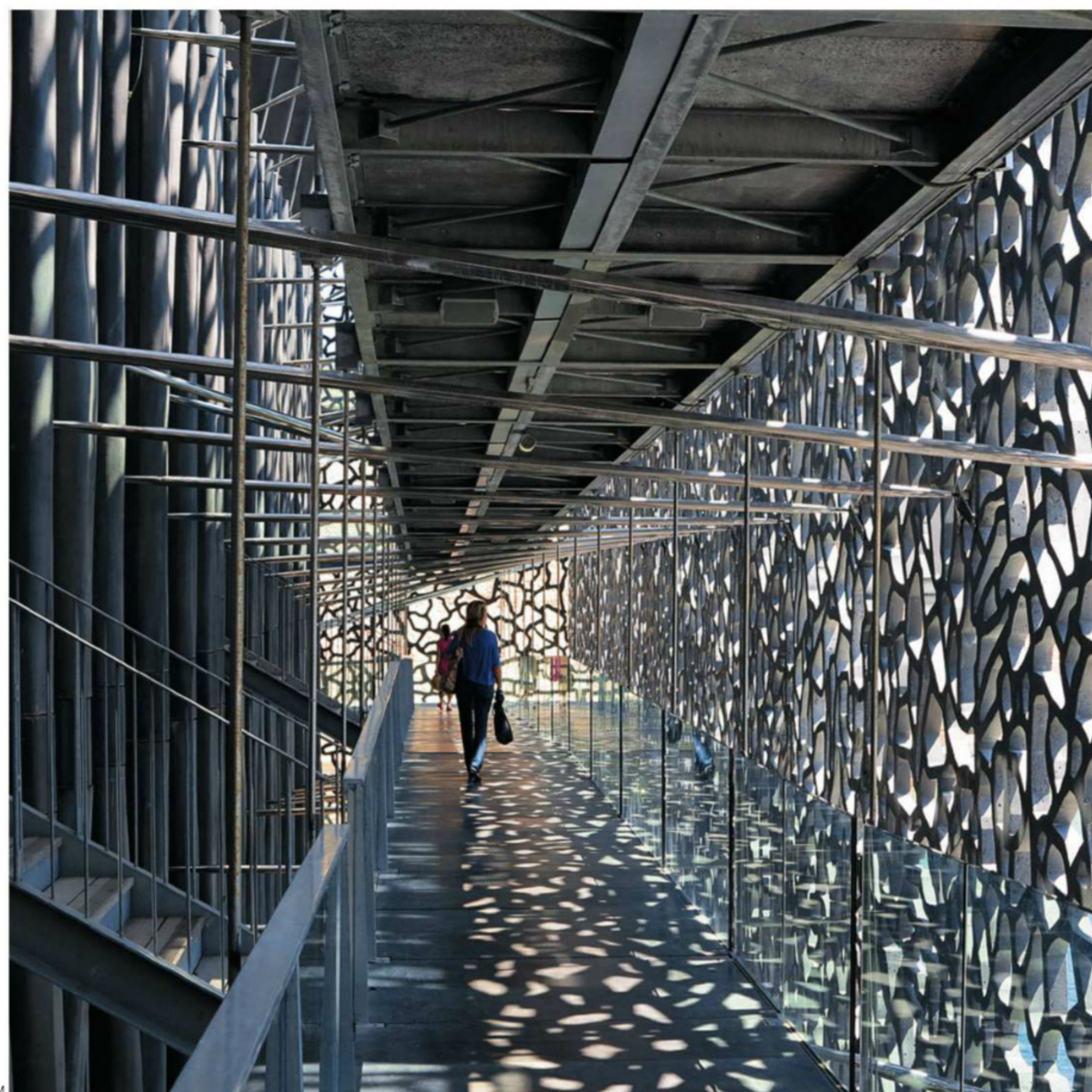
are fashioned according to the principles of Eugène Freyssinnet, a pioneer in pre-stressed concrete: as hinged bearing. Like the columns, they are also of UHPC. Therefore, because only one material is used, these brackets are maintenance-free. The tension cables pass through them and compress the columns and pre-tensioned beams (400 × 600 mm) into a homogeneous yet elastic structural system. The secured – but flexible – column brackets can absorb the continual material expansion and contraction of the 52 × 52 m seamless concrete deck caused by temperature fluctuation, as well as sudden horizontal jolts caused by earthquakes.





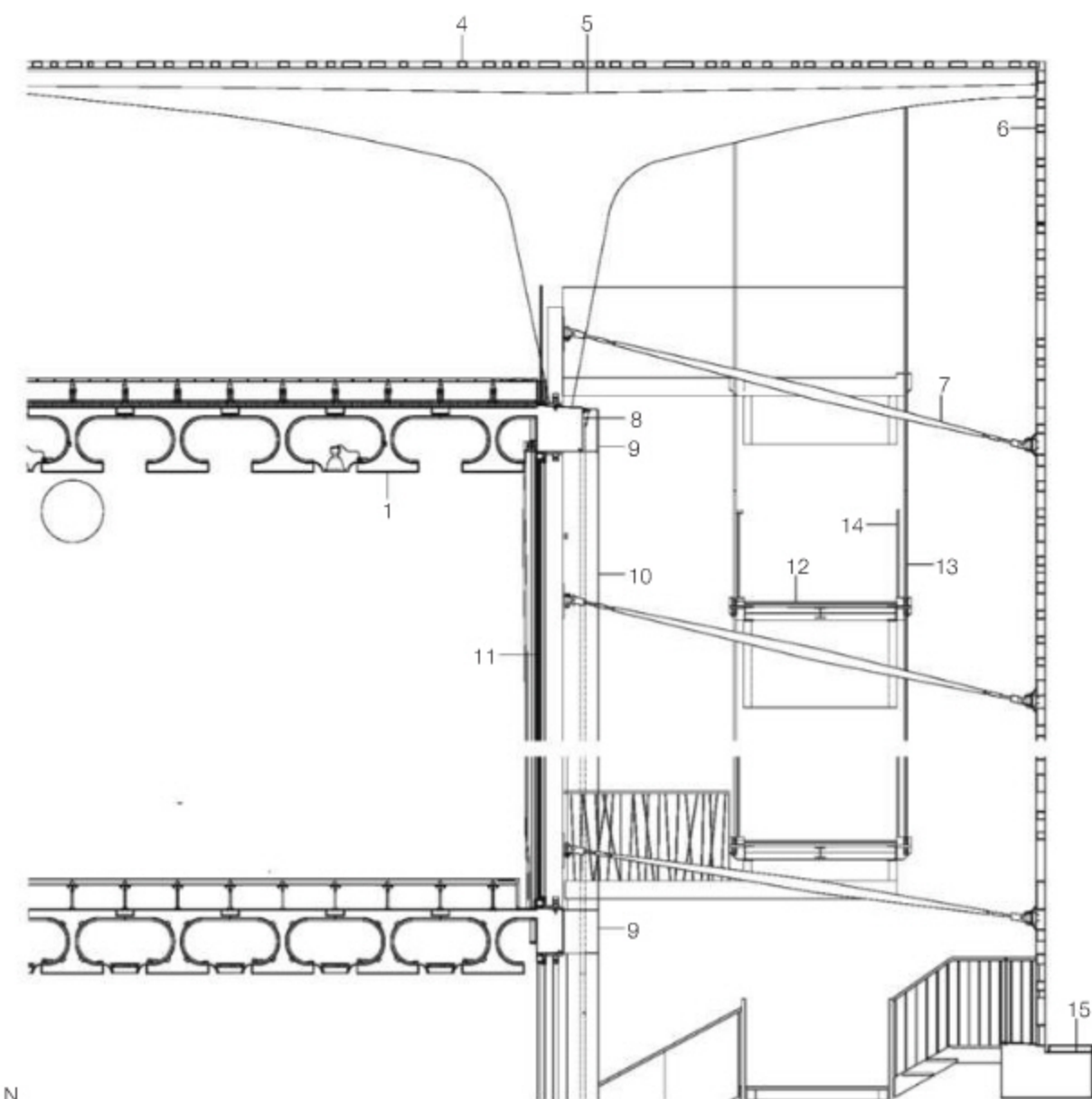
- L Detail of ceiling deck with cut-outs for luminaires scale 1:20
 M View of interstitial space and circulation ramps between the lattice facade and the glass cube bordered by tree columns
 N Section through void, lattice facade and glazed facade (exhibition space) scale 1:100
 O Point-fixed lattice panel

L



M

- 1 ceiling module: 3 x 23 m, pre-tensioned
 2 acoustic insulation
 3 recessed luminaire
 4 horizontal UHPC lattice panel: 70 x 80 mm cross-section, 3000 x 5800 mm format
 5 UHPC roof beam
 6 vertical UHPC lattice panel: 70 x 80 mm cross-section, 3000 x 5800 mm format
 7 stainless-steel strut, point-fixed, ball-bearing hinge
 8 C70 in situ concrete edge beam, post-tensioned
 9 UHPC connecting bracket
 10 UHPC tree column, post-tensioned
 11 glazed facade fronting exhibition spaces: double glazing, glare-protection curtain (cloth)
 12 ramp: 20 mm UHPC panel supporting structure: steel-channel beam
 13 ramp suspension: stainless-steel rod
 14 safety railing: glass
 15 lattice-facade support: reinforced-concrete edge beam



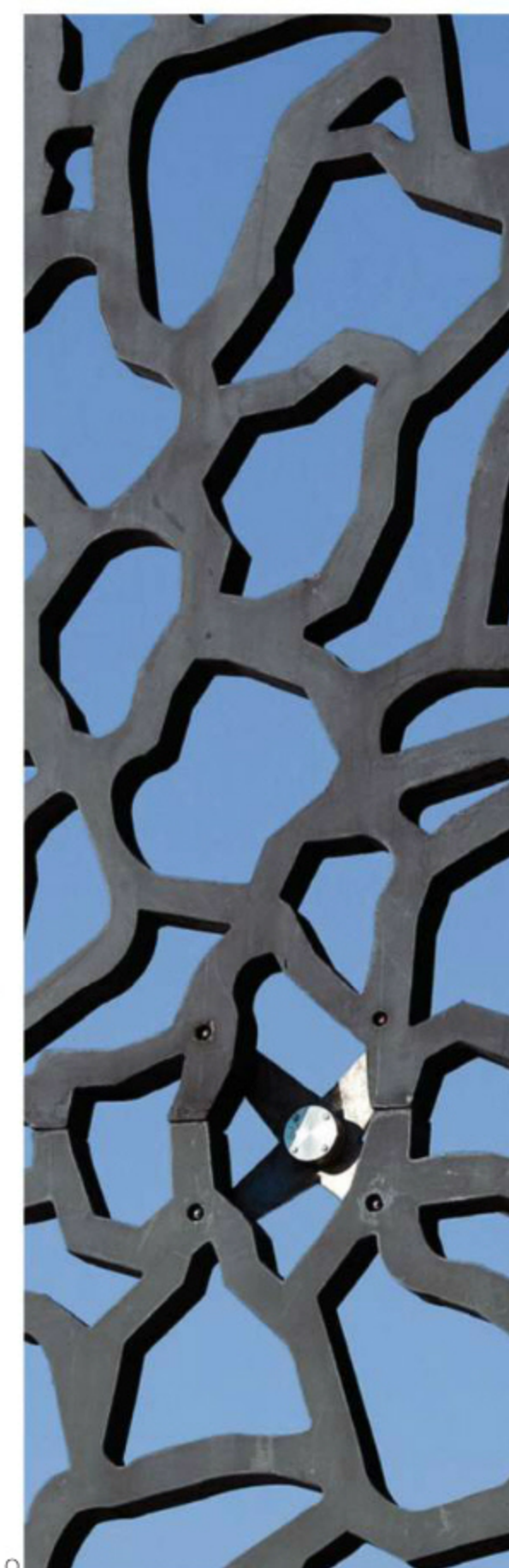
N

To receive permission to build it was necessary to demonstrate the brackets' capacity, as well as that of the overall structure, in tests. At the same time, in cooperation with the building authorities, the team developed computational software capable of taking the columns' complex geometry into account.

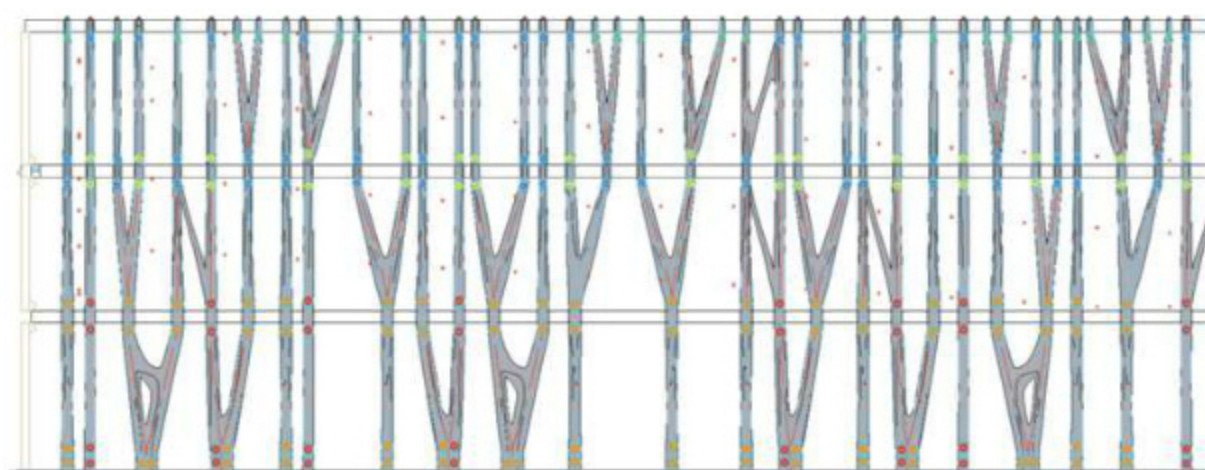
Ceiling deck and column connections

Each of the 52.0 x 52.0 m seamless ceiling decks is made up of 23-metre-long prefabricated ceiling components that are bonded in a shear-resistant connection to the 600 x 400 mm post-tensioned edge beams by pouring the latter in situ. In the design sub-

mitted to the competition, Ricciotti foresaw ceiling panels in UHPC, but, to save costs, C70 concrete was used. They were produced in a pre-tensioning process in which the concrete is poured around the cables necessary to create the shear-resistant bond. Because the admissible tolerance was a mere 5 mm, it was a great challenge to achieve dimensionally accurate connections and precise direction of forces from the in-situ-concrete edge beams into the precast UHPC columns. The solution: a UHPC bracket flush with the respective column in which the concrete was not poured until the location of the columns had been fine-tuned. Prior to the installation of



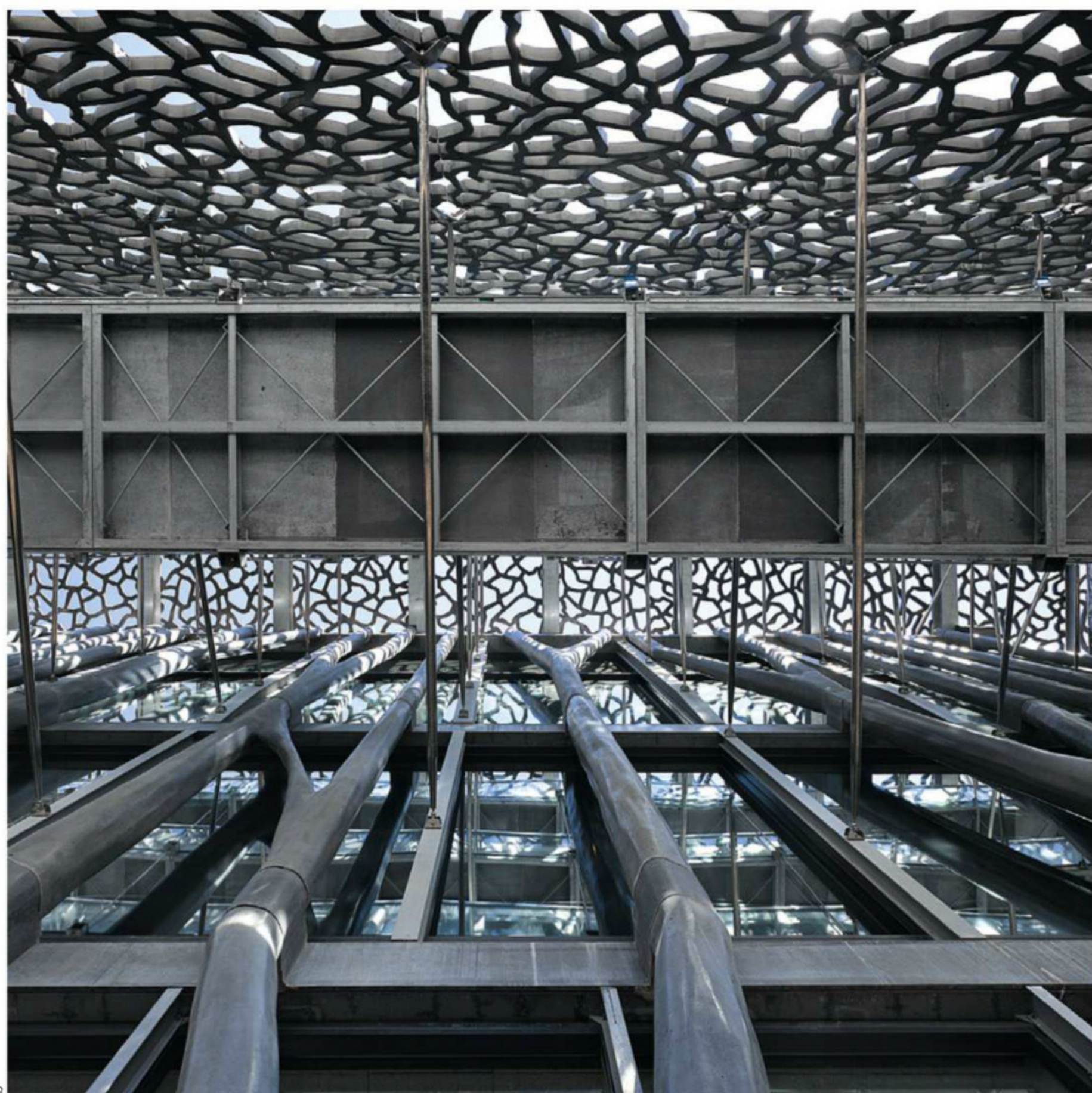
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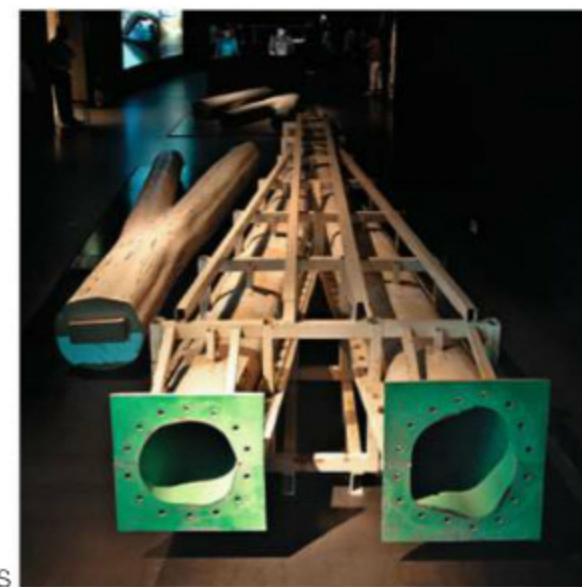
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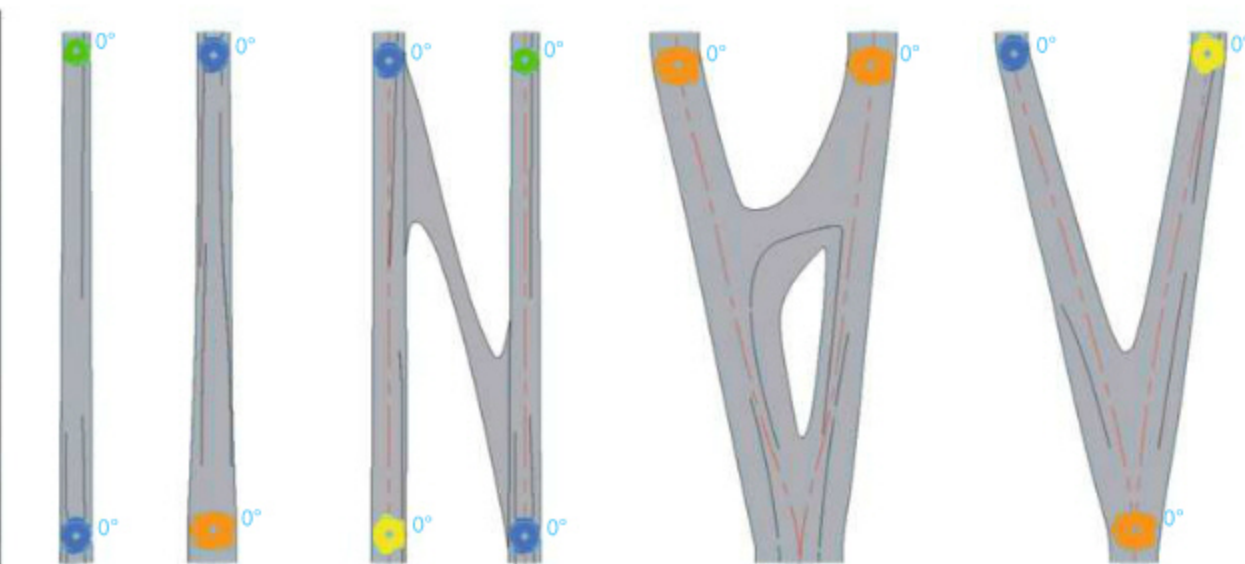
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R



S



T

the UHPC columns, the construction workers poured the concrete ceiling and edge beams; thus, they act in unison. They also set up temporary supports (ill. V). Once all of the columns were mounted, the cable was secured on the roof and ground storey and tightened with a winch, and then the cable and the sheathing tube were compacted by means of a special cement mortar. After the structural integrity of the overall structural system was achieved, the temporary supports were removed. Connecting the columns to the edge beams by means of brackets also facilitates varying the geometry, which, in turn, gives the structural members an animated plasticity: where the column continues without interruption past an edge beam, no brackets are required (ill. U1). In the second version, the entire cross-section of the column top connects to the bracket (ill. U2), and in the third version half of the column top is positioned below the edge beam and half of it below the bracket, whose depth is less than in the first two versions (ill. U3).

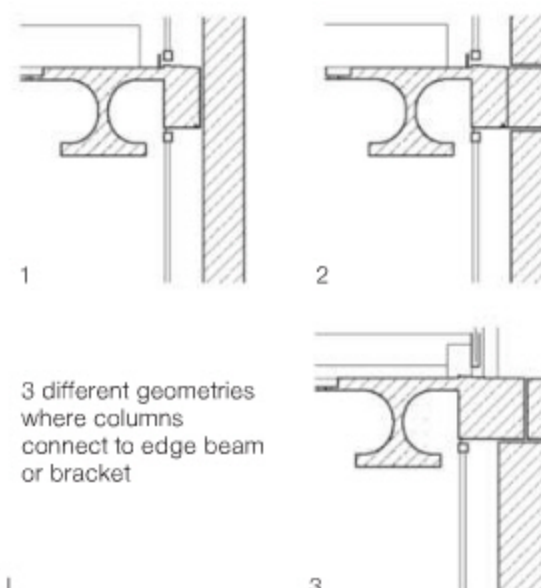
Continual latticework of prefabricated elements

The outermost skin is made of self-supporting UHPC elements that take the form of latticework. Here too, the wooden master moulds served as basis for the negative moulds for the crisp-edged 80 × 70 mm

cross-sections. The standard format measures 3.00 × 5.80 m; at the building's edges, special formats are employed (ill. B). Thanks to the narrow joints between them, the panels' three different patterns give the impression of an endless, seamless latticework. The individual elements are only discernible from a short distance (ill. F). On the ground floor the panels, which are in an upright position, rest on the ground and are connected to the facade elements above by means of integrated pins. Diagonal stainless-steel struts run from the columns (and posts) of the glazed facade, passing above the encircling ramps, to the latticework elements; these allow the latticework to absorb horizontal loads. Cruciform point connections whose bearings allow them to compensate in two directions for tolerances hold two neighbouring panels in the vertical joints (ills. B, E), as well as the edge latticework elements (ill. O). Each standard element is steadied by four struts. The flexible bearing prevents stresses in the material that would otherwise result from wind loads or the contraction and expansion caused by temperature fluctuation. The elements are positioned horizontally on the roof – separated from it by elastic polyurethane bearers – on a metal supporting structure which is mounted to the T-shaped UHPC columns at the roof's edge (ill. G).

The MuCEM is to date the most complex ultra high performance concrete building, and at 7,200 m², its sheathing is among the largest. This could be the beginning of a new era of materiality in construction: in August 2013, the Jean-Bouin Rugby Stadium in Paris – also designed by Rudy Ricciotti – was inaugurated. Its UHPC envelope has a surface area of 23,000 m². And in 2016 the double curved canopy at the Forum des Halles metro station entrance by Patrick Berger will be completed. Ultra high performance concrete is still in the experimental phase, but it has already become a part of the repertoire of high-quality architectural and technological building materials.

- P Elevation of tree columns: UHPC across three levels
- Q Perspective of structural system
- R View toward roof along tree columns
- S Wood prototype of tree column and formwork for definitive UHPC column
- T 4 column types and variations: straight, conical, N-shaped and Y-shaped, the 5 different column cross-sections are labelled in the colours red, orange, blue, yellow and green
- U 3 different geometries where columns connect to edge beam or bracket
 - 1 column continues past edge beam
 - 2 entire cross-section of column's top connects to bracket
 - 3 half of column top connects to bracket, half to edge beam
- V Installation of the UHPC precast columns: secured to roof decks (incorporating edge beams) by means of UHPC brackets



U

3



V

An Acrylic-glass Curtain Secured with Adhesives – Vitra's SANAA Factory

Frank Kaltenbach



Others involved in the project: see page 109

As light as a curtain billowing in the breeze – that is how SANAA imagined the new factory hall at the Vitra Campus in Weil am Rhein. State-of-the-art technology was employed to ensure that to the greatest extent possible neither the connections nor seams would infringe upon this powerful image. It was clear to Sejima and Nishizawa that the curtain's folds must appear random – that they should by no means bring to mind a repetitive facade adhering to a grid. The lightness and lyricism for which the Japanese architects' buildings are world-renowned is what motivated the clients to commission them. This novel factory – a new typology – demonstrates digital design and the fully automated, nearly soundless production of contemporary furniture. And this explains why the new building sets itself apart from the existing halls. In the 1980s Nicholas Grimshaw's aluminium grid facades made reference to the modular character of industrial production. Ten years later Álvaro Siza employed a brick envelope as an homage

to haptic surfaces and solid, timeless craftsmanship. But what material is best suited to approximating the surface qualities of a lustrous curtain? What material is 11.40 metres long and can be shaped at will? How should the vertical seams where panels meet and the connections to the building carcass be executed so that they remain nearly invisible? Ultimately acrylic glass (sheets with a thickness of only 6.5 mm) that is manufactured in a coextrusion process was selected: the backing is white, while the cover coat is transparent. The result is compelling from the architectural standpoint: because the building has a rounded form, the white curtain has no beginning or end. And the building envelope underscores the overall intention – from the scale of city planning down to the corporate identity – to create a building that is as unassuming as it is spectacular. The client requested a 20,000 m² factory as a replacement for one that was half that size. To the residents of the adjacent homes, the thought of having a 12-me-

tre-high continuous wall right in front of their living-room windows was disconcerting. According to Kazuyo Sejima, "In our search for the most functional form, we sketched the paths of the trucks over and over – the irregular floor plan is the result of this process." The curves mitigate the frontal impact of the 6000 m² facade. When the sky is overcast, and each spring when the cherry trees are in bloom, the vast structure seems – visually – to almost completely dissolve into thin air.

Imperceptible modularisation

For logistical purposes, the 550-metre-long facade was subdivided into panels with a width of approximately 2.0 metres. The narrow vertical seams in the valley of the undulation are backed with white jointing strips and are only discernible from a very short distance. To achieve the irregular appearance of a curtain's folds as efficiently as possible, the architects developed three different cross-sections (ill. F). The undulating panels can also be inverted (always with the



- Site plan scale 1:10,000
- 1 Main entrance for visitors
 - 2 Vitra House, architects: Herzog & de Meuron 2010
 - 3 Vitra Museum architect: Frank Gehry 1989
 - 4 Vitra Pavilion architect: Tadao Ando 1993
 - 5 Fire station architect: Zaha Hadid 1993
 - 6 Factory hall architect: Álvaro Siza 1994
 - 7 Factory hall architect: Nicholas Grimshaw 1986
 - 8 Production hall architects: SANAA 2013
 - 9 Entrance to underground parking / Employee entrance

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transparent coating facing outward). Consequently, there are six options. By introducing panels with special widths, the architects increase the variety: these additional formats are necessary because the panels next to openings always end in a "summit".

From flat sheet to undulating panel

A 13-metre oven was required to shape the acrylic glass sheets. The flat sheets are laid on the hand-polished CNS-milled form and are held in place at their edges (ill. A). At a temperature of 160°C the material softens, and vacuum suction pulls the acrylic glass into the form (ill. B). The oven in which the forming and gradual cooling takes place is computer-operated. The cooling process creates material stresses. When plastics come into contact with the type of volatile solvents that arise when silicone adhesives are introduced, the stresses that come about can lead to chemical corrosion and stress cracks. After the gradual cooling process the panel is heated to 80°C – a pro-

cess known as tempering – to alleviate these stresses. The edges, which are a result of the production, are subsequently cut off using a fully automated 5-axis mill. In this manner crisp edges – which enhance the abstract appearance of the facade – were created.

Suspended like a curtain

At the expected temperature fluctuation of 40° between winter and summer, the change in length – as determined in the calculations – of a 12-metre-long panel of acrylic glass is 70 mm. Rigid connections would cause large stresses to arise in the material, as well as bulges between the fasteners. Due to the thinness of the material, setting the panels on the base would also cause them to deform. Therefore, the only fixed connection of the panels is at the parapet level – the rest of the panel is suspended. This guarantees that, even when the length expands or contracts, the crisp horizontal upper edge will remain intact. The

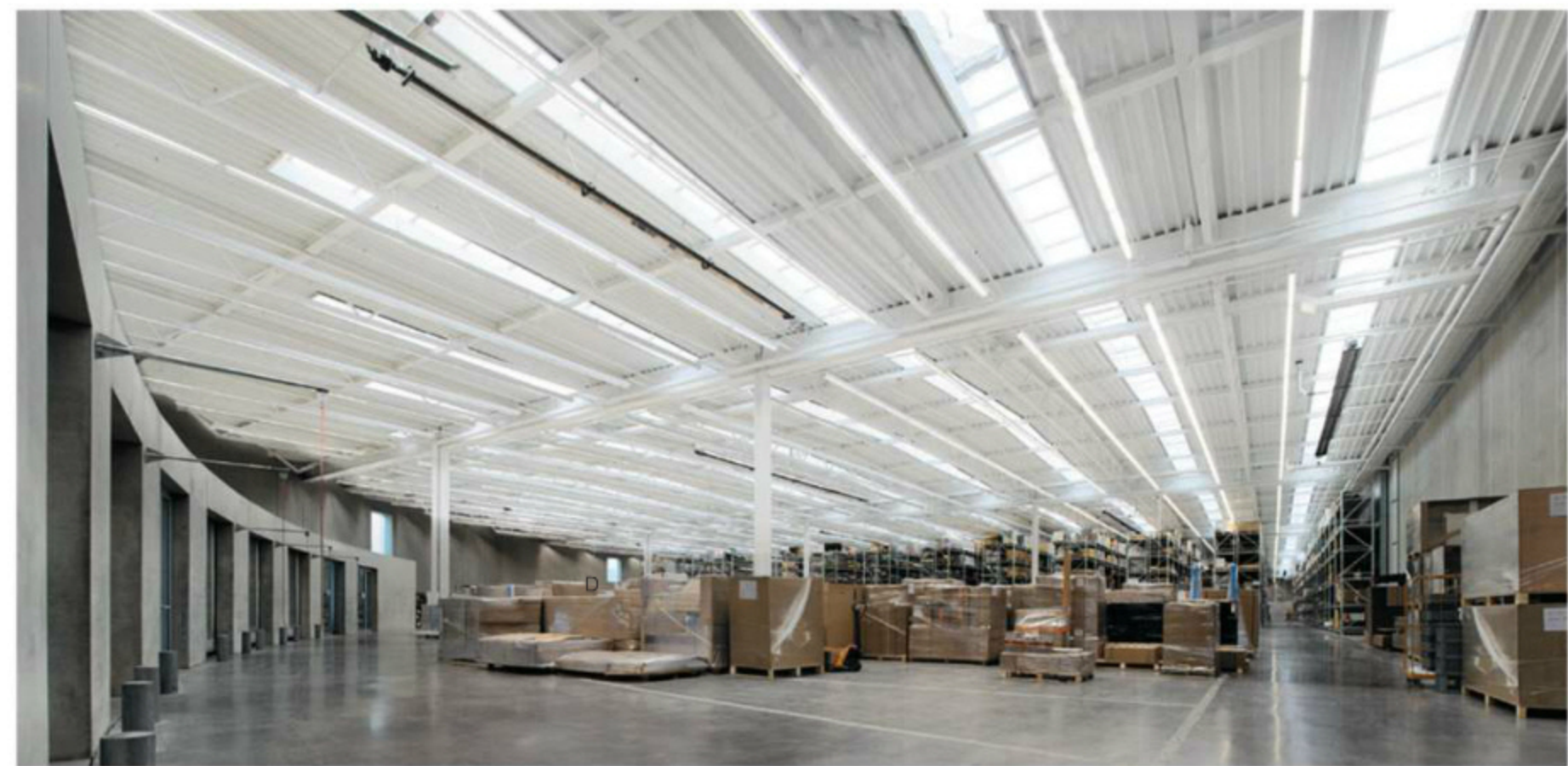
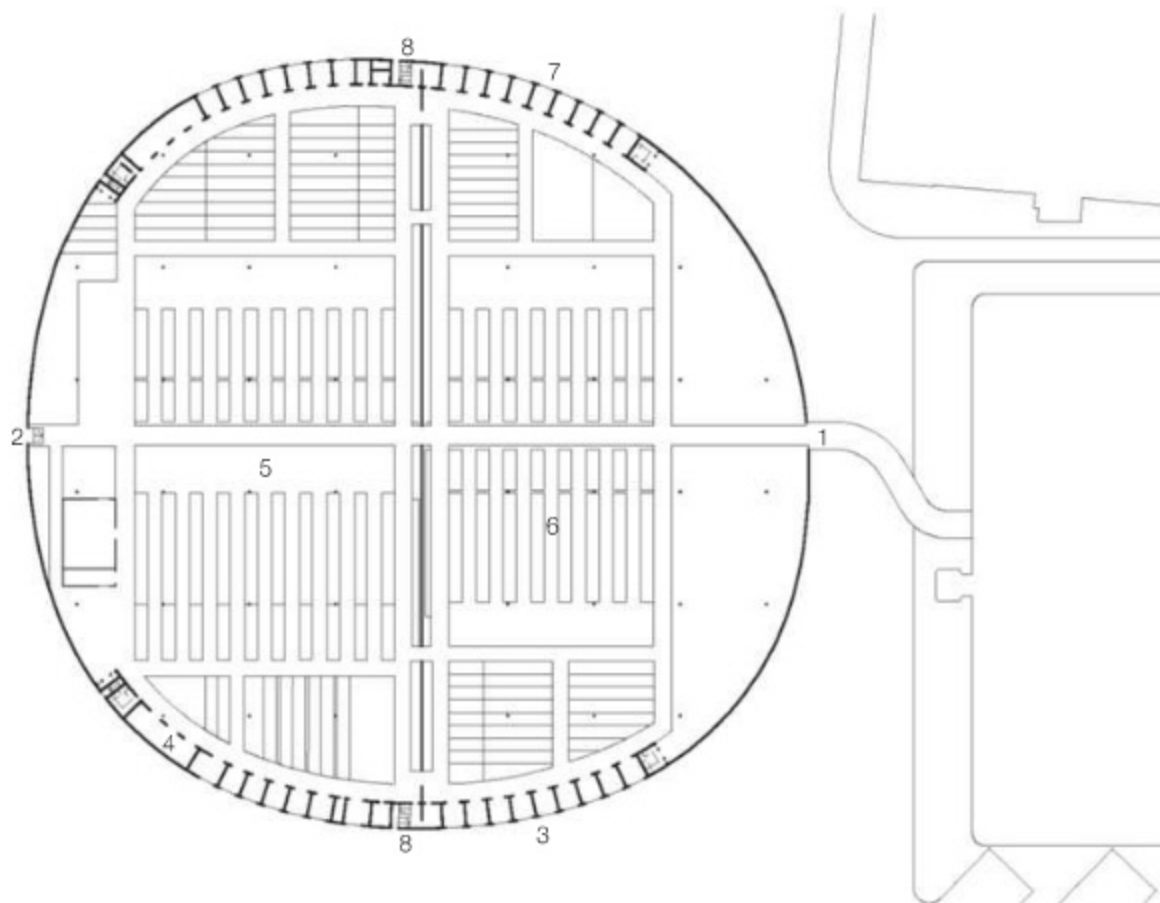
back of the acrylic glass is adhered to the aluminium supporting structure – which is only connected rigidly to the factory's reinforced concrete wall at the parapet level. The fasteners connected to the rest of the panel allow movement. Accordingly, the adhesive connections to the supporting structure vary depending on the type of load: the so-called vertical load brackets between the two upper bars support the panel's own load (about 160 kg). Because when subject to continual shear stresses, connections tend to creep, in the calculations the permissible stress is low and calls for large surface areas of adhesives. Consequently, the vertical load brackets have a considerable surface area. They are fashioned from sheet metal and shaped to fit the panels' respective curves. Their width is calibrated to account for the respective load. Owing to their great length, the brackets are executed in hinged segments (three each) so that they do not assist in absorption of wind loads; they absorb shear only (ill. O, at top). The

Plan of ground floor
scale 1:2000

The 20,000 m² hall is subdivided by a fire wall. The southern half was erected first, and is situated above the new parking garage and building-services spaces. The construction of the northern half, which has no basement, was constructed later (following the demolition of an existing hall).

- 1 Covered main entrance
- 2 Secondary entrance
- 3 Delivery ramp (incoming) / Loading dock
- 4 Office cubicle
- 5 Furniture assembly
- 6 High-rack storage
- 7 Delivery ramp (outgoing) / Loading dock
- 8 Stair to parking and building services

Building data
Diameter east-west: 156 m
Diameter north-south: 159 m
Column grid: 17.5 x 22.8 m
Ceiling height: 9.5 m
Building height: 11.40 m
Surface area of facade: 5,740 m²
Surface area of building above grade: 20,455 m²
Surface area of building below grade: 10,565 m²
Volume of building above grade: 206,000 m³





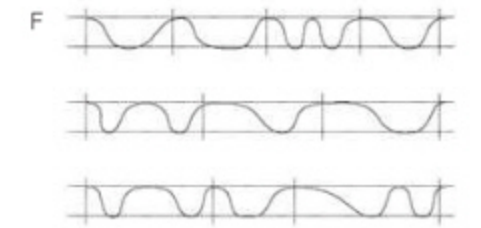
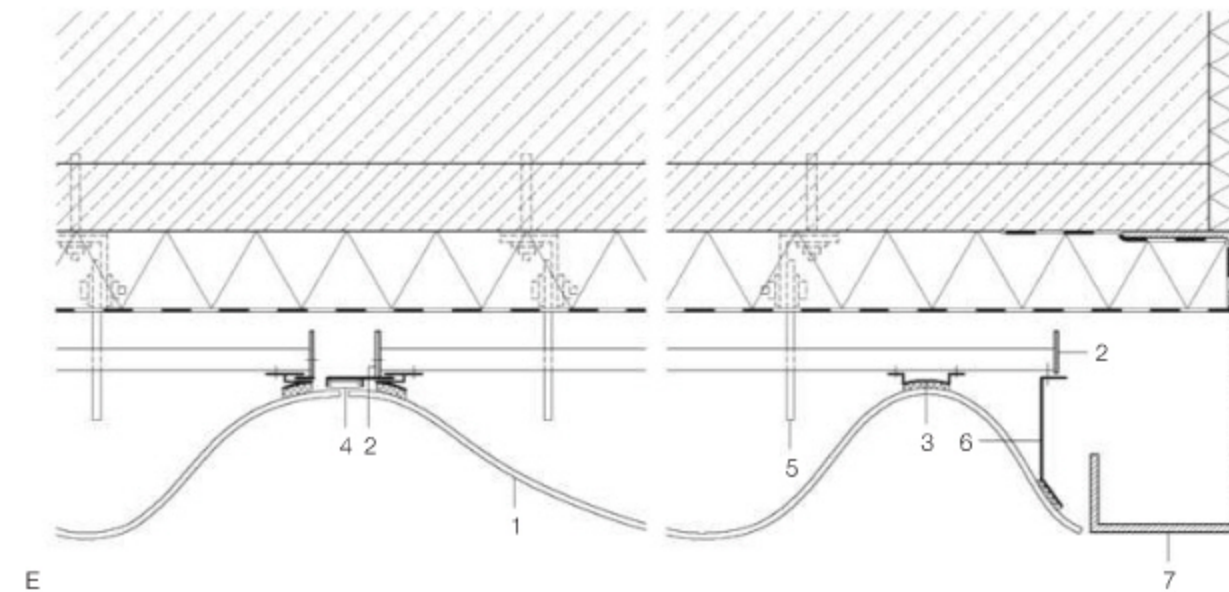
wind suction fasteners absorb the horizontal wind loads. The panel itself spans the distance between the bars: the undulating form provides the necessary stiffness. Only the edges – which in some cases are planar – are glued to a stiffening profile to limit the deformation. For the crane-assisted mounting of the panels (to which the supporting structure has already been adhered), custom delivery pallets are employed: they provide stiffening to protect them from the bending stresses that occur when they are unloaded from the lorries. Then the pallet is removed and the panel is suspended from the clips projecting from the building carcass.

Admissibility of adhesives determined on case-by-case basis
In compliance with German building-regulation laws, for approval, a projected acrylic facade must undergo testing to verify its durability and structural soundness. The search for the suitable adhesive begins with the following specifications: because the adhesive must compensate for the different radii between aluminium brackets (part of the supporting structure) and undulating panel, application in a thick coat must be possible. It must allow for thermal expansion and contraction between aluminium and acrylic glass. It must be resistant to ultra-violet rays and heat, and must demonstrate

viable strength when tensile and shear loads are applied. Structural-glazing (SG) silicone turned out to be the most feasible solution to connect the thin acrylic glass to the aluminium supporting structure because it best fulfils the requirements listed above. In addition, there is a European Union norm that can serve as a guideline for the structural dimensioning and the manner in which they are tested. However, for the type of long-term shear loads arising in the acrylic panels designed by SANAA for this building, structural-glazing silicone requires an extensive bonding surface. In the series of tests of the wind-suction fasteners' tensile strength carried out subsequently, care was



- A Extrusion of the acrylic glass panels. The flat panels are laid on the CNS-milled form, then melted at a temperature of 160 °C in a computer-operated oven (at back of image); vacuum suction pulls the acrylic into the form. After the gradual cooling process the panel is heated to 80 °C to alleviate material stresses.
- B The acrylic glass panel after completion of oven-forming process. The edges, which are a result of the production, are subsequently cut off using a fully automated 5-axis mill.
- C The cover plates at the parapet and the lower end are adapted to the respective undulating form.
- D Minimalist parapet: the "curtain" seems suspended in mid-air, neither mounting mechanisms nor joints are visible. The clear layer of acrylic glass on the white layer below makes the edges of the panels shimmer like crystal sugar.
- 1 6.5 mm acrylic glass, transparent/white, co-extruded, thermally reshaped, dimensions: 11,380 x 1800 mm, glued to 25/100 mm aluminium RHS
42 mm ventilated cavity
weather-proofing membrane
80 mm mineral-wool thermal insulation
400 mm semi-prefabricated reinforced-concrete element (dimensions: 9740 x 2400 mm)
- 2 5 mm aluminium edge profile
- 3 wind-suction fastener: 7–9 mm silicone adhesive on 2/50 mm curved aluminium, on 25/100 mm aluminium RHS, hung from facade clips, free to move
- 4 vertical joint: 6.5 mm acrylic-glass jointing strip glued with adhesive tape to edge profile
- 5 8 mm aluminium clips with plastic insert
- 6 2 mm aluminium edging
- 7 trim: 8 mm aluminium, white
- 8 vertical-load brackets: 7–9 mm silicone adhesive, aluminium sheet bent to shape, in three flexible segments, bolted to facade clips (not free to move)
- 9 height-adjusting screw
- 10 2 mm perforated aluminium sheet

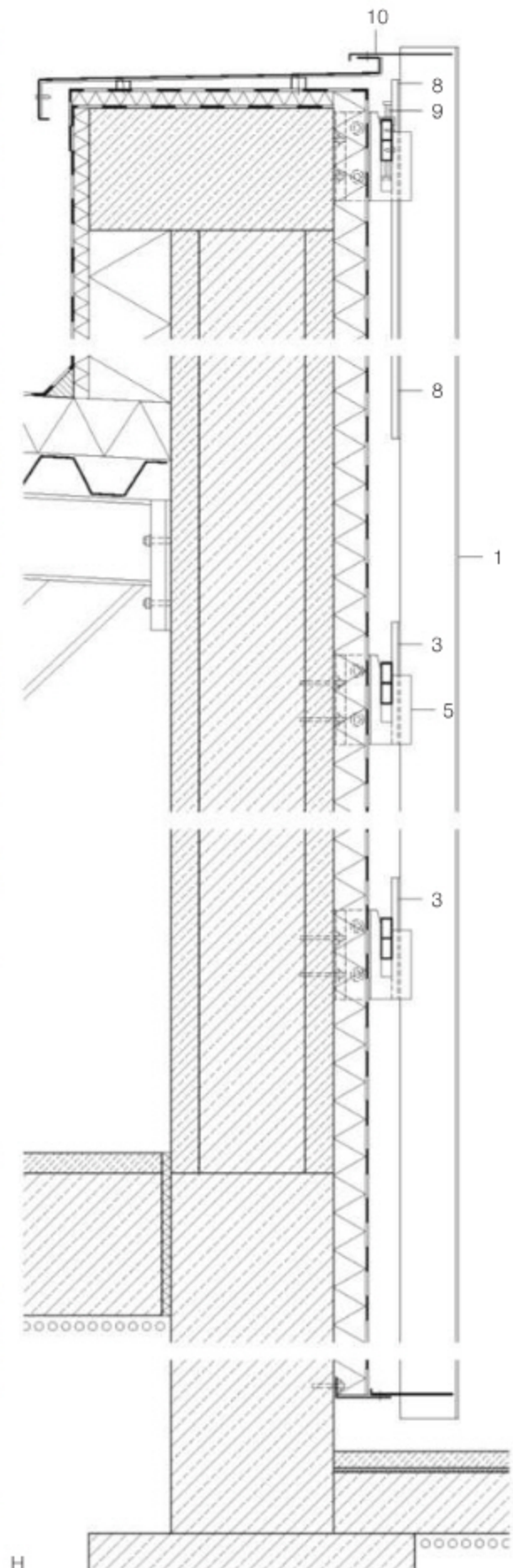


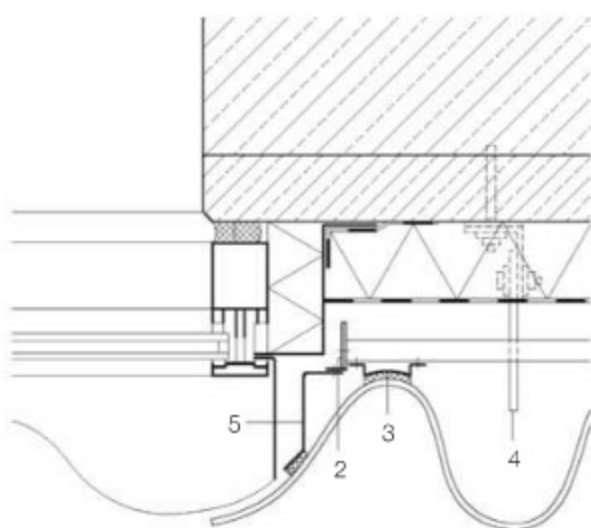
E Vertical joint and lateral junction with office window or loading dock. Horizontal section scale 1:10

F Geometry of the three standard elements of 6.5-mm-thick acrylic glass, dimensions: 11,380 x 1800 x 150 mm. The additional versions are attained by standing these three on their heads.

G The facade upon completion

H Vertical section through facade scale 1:20

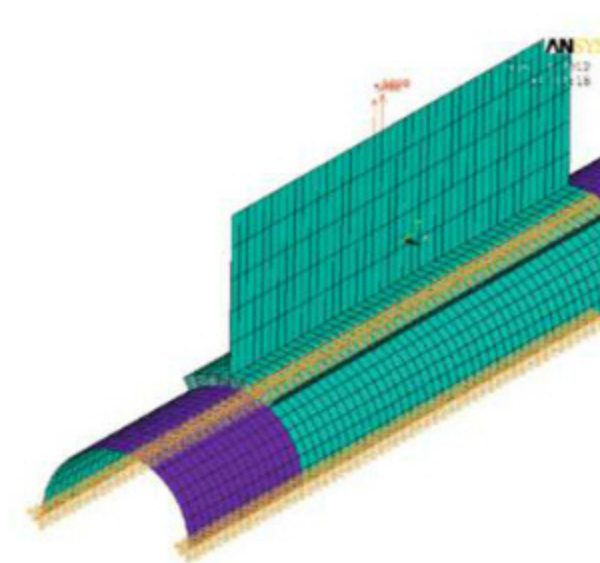




J

J,K Sections window scale 1:10

- 1 6.5 mm acrylic glass, transparent/white, co-extruded, thermally reshaped, dimensions: 11,380 x 1800 mm, glued to 25/100 mm aluminium RHS
- 2 42 mm ventilated cavity
- 3 weather-proofing membrane
- 4 80 mm mineral-wool thermal insulation
- 5 400 mm prefabricated reinforced-concrete element
- 6 5 mm aluminium facade clip
- 7 wind-suction fastener: 7–9 mm silicone adhesive on 2/50 mm curved aluminium sheet
- 8 8 mm aluminium clips with plastic insert
- 9 2 mm aluminium edging
- 10 bracket to absorb own weight: 7–9 mm silicone adhesive, aluminium sheet bent to shape, in three flexible segments, fix-mounted to facade clips
- 11 height-adjusting screw



L

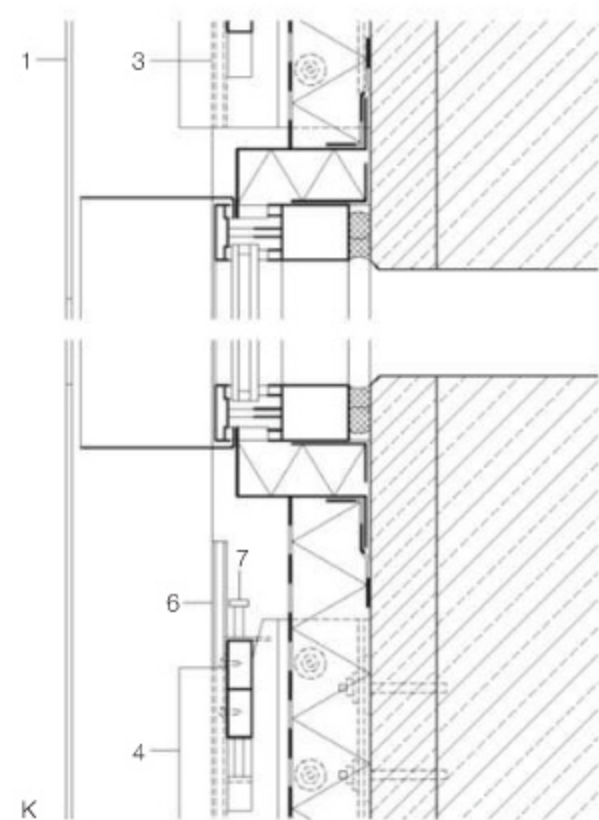
taken to replicate the precise geometry of the panels and the varying lengths of the fasteners (ills. M, N). Because the acrylic glass cannot be satisfactorily tested in discreet experiments and not all of the distinct gluing situations could be replicated, the facade engineers – named: imagine structure – employed ANSYS to generate comprehensive finite-element models of the three panel types; in this manner they produced a virtual replication of the experiment and could make calculations based on it (ill. L). When conformity between the experiments and the simulation was achieved, the design resistance was extrapolated from the stresses thus ascertained.

Redundancy of the connections

To obtain permission from the building authority, there must be a back-up system (in case of failure of the silicone adhesive: the engineers integrated it in the supporting structure. In the unlikely scenario that all four strips responsible for the panel's own weight fail and become dislodged, the panel (with the supporting structure) will shift downward slightly within the clips that are mounted on the reinforced-concrete wall. These same clips also absorb wind loads. In this case, all adhesive connections of the wind-suction fasteners – which absorb only horizontal wind loads – temporarily also bear the own load of the panel. From the exterior, failure would be clearly and quickly identifiable due to the accompanying vertical misalignment. The mounting frame facilitates quick replacement of the panels.

Putting the building to the test

In the first months following the installation of the panels, the change in length has been as much as 50 mm. This vertical movement of the "billowing curtain" is, however, likely only perceived by the few employees who take regular smoking breaks near the base of the facade. Architecture aficionados who visit the SANAA factory while touring the Vitra Campus aim their cameras at it without fail. And the sceptical neighbours are, in the end, satisfied, because the factory does not turn its back to them, and only slightly obstructs their views of the Black Forest. Most importantly, the new building provides a pleasant work environment and is a highly efficient industrial facility: the ribbons of skylights are narrower – but placed closer together – than is customary: this slight adjustment supplies the space with even daylight. All cables and ducts are integrated in the slender steel structure and therefore do not distract from the spatial clarity; they defer to the muted grey-and-white colour concept. When necessary the four quadrants of the near circle can be subdivided and used separately.



K

L Adhesive connection of undulating acrylic panel to aluminium supporting structure: 3D model by imagine structure

M,N Adhesive connection of undulating acrylic panel to aluminium supporting structure: stress tests at gdb Lab, Dornbirn

O Facade panel glued to supporting structure. Where the upper part of the panel is secured to the building carcass, 4 strips adhered to the panel bear its own weight. The rails in the lower reaches are held in place by individual connections that, as wind-suction fasteners, only absorb horizontal loads.

A–C, L–O: Photos: Matthias Michel, imagine structure O



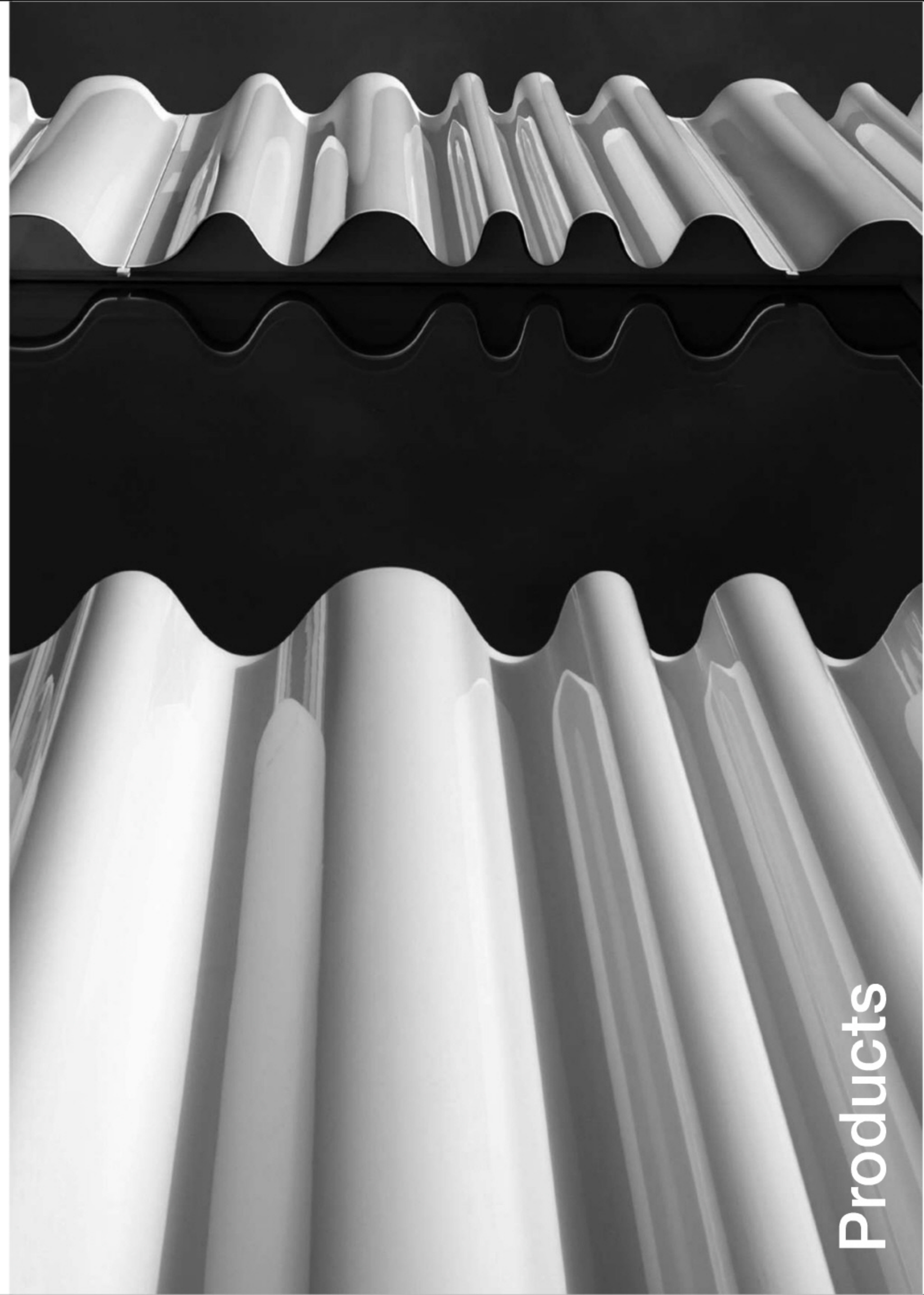
M



N



O



Products

Materials and Finishes



Advanced surface and techniques achieve timeless quality for new mosque

The Jamia Mosque Sultania and Education Centre in Brierfield, Lancashire was recently completed following a 10-year design and build project and an investment of £3.5 million from the local Muslim community. The new building, by architects Archi-Structure, Baildon, West Yorkshire, is now one of the largest mosques in Lancashire, serving up to 2,000 worshippers. Its interior decoration honours the past by using many traditional materials whilst at the same time also embracing modern methods of construction and advanced, high-performance materials such as DuPont™ Corian®.

The new facility is dedicated to both education and worship and has eight classrooms on the lower ground floor. The spacious main prayer hall offers a ladies prayer area on a mezzanine level, for which a special design solution was needed to separate and yet connect the two areas.

Designer Umar Faruque of Studio Architekton, who specialises in contemporary Islamic interiors, was called in to create this feature and came up with the concept of 38 decorative arches inspired by the Moorish architecture of Andalusia. The arches were designed to complement the marble sourced from Pakistan and Turkey that fea-

tures in the main hall, but for this project the designer wanted a flexible modern material that would work in harmony whilst also being easy to fabricate and fit.

Umar Faruque was familiar with the properties of Corian and the way in which these have been applied to various projects around the world, and was keen to explore the use of the material in his design for the arches. He chose local specialist M and L Solid Surfaces for the on-site design, fabrication and installation, having worked with the company previously and knowing its background in engineering and ability to achieve the precise tolerances required for this project.

With technical support from DuPont Corian distributor CD (UK), the manufacture and installation of the arches was completed within 12 weeks, using 30 sheets of the material. The two colours specified for the design were the deep, rich Cocoa Brown and the veined mineral-look Arrowroot, which were chosen as a very near match to the colours of the marble in the main prayer hall. The arches were constructed from an MDF base.

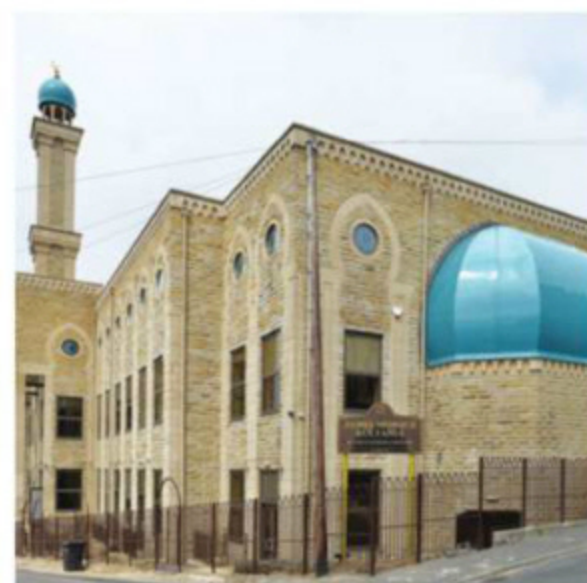
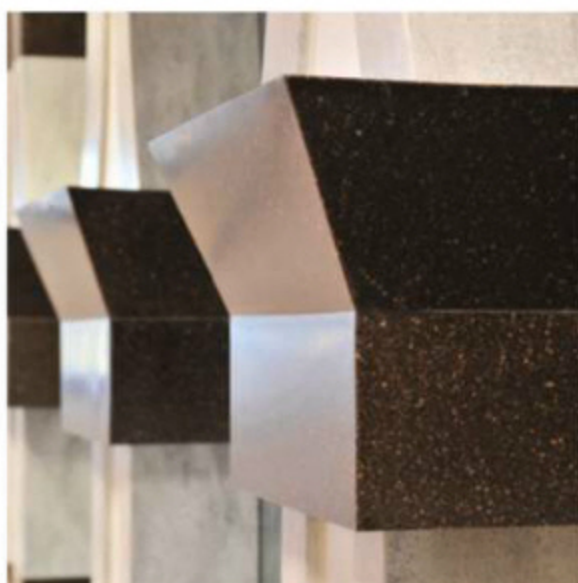
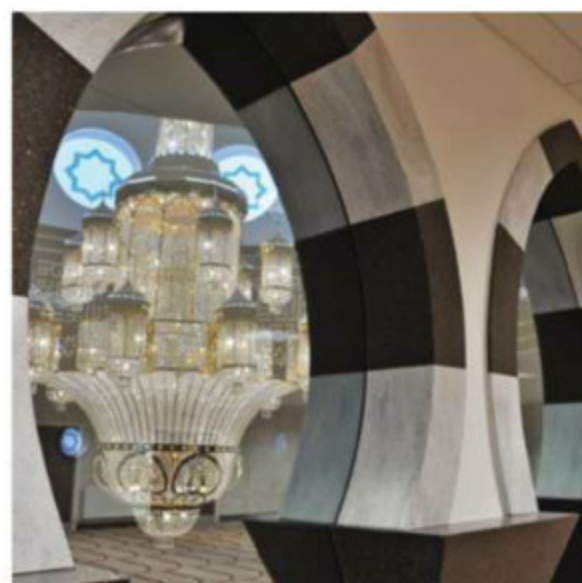
Skilled techniques used to fabricate the complex curves included thermoforming

and the seamless bonding of the colours to ensure a sleek, uniform finish throughout. The arch design is now a standout feature that has become one of the most distinctive and admired within the building.

Two members of the mosque commented on the design. Said Masud Ahmed, "We were unaware that a material famous for worktops could be so adaptable and creative, and our faith in the architect and contractor has been rewarded with a quality product and design, which has been completed to a very high standard."

Added Khalid Hussain, "The Sultania Mosque build has been a huge project for the community and those involved in the construction; everyone is delighted with the final result and appreciative of such a unique building with its many artistic features, all complementing each other. The use of DuPont Corian was a new but ingenious idea to us; we are pleased with how beautiful it looks, it has become one of the main talking points about the design."

□ CD (UK) Ltd
United Kingdom
☎ +44 (0)113 201 2240
www.cdukltd.co.uk



Borough Vadiut, London - Architect: Jestic and Whiles - Contractor: McGrath Group - Photographer: Paul Kozlowski

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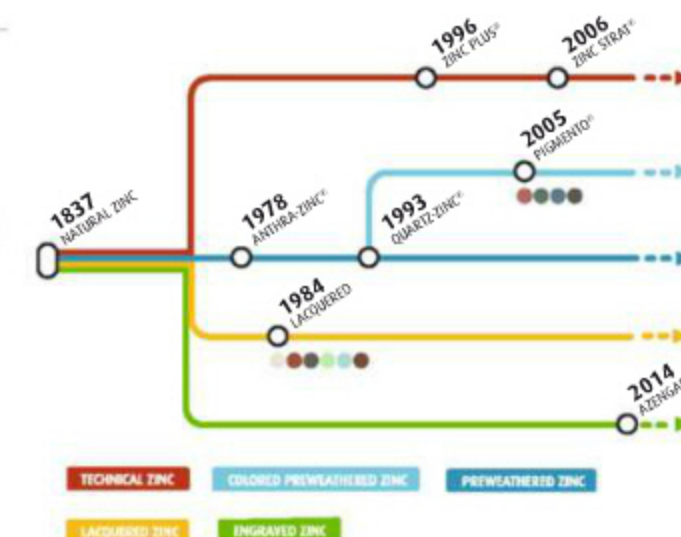
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Streamlined appearance suits new-build and refurb

Matching floor-to-ceiling interior finishes can be achieved with Trend agglomerate, a versatile composite for use on most vertical and horizontal surfaces. The company says this co-ordinated styling of decorative finish is currently proving popular with designers, architects and developers who are keen to specify a streamlined look, and the material is suited to a wide variety of new-build and refit applications such as wall cladding, floors, partitions, reception desks, panels, vanities and countertops.

Made from recycled material, the agglomerate is just 6.7 mm thick, but is claimed to be as tough and hardwearing as granite slab, and resistant to water, chemicals, impact, abrasion and thermal shock. It can be fitted to most substrates, from timber and tiling to plaster and concrete. The natural granite and quartz chips or recycled glass granules are bonded together with polyester resin, and the material is available in a variety of square and rectangular slabs measuring up to 3 x 1.2 m.

These can be water-jet cut and gently curved to create seamless high-end surfaces. More than 40 finishes are available, including a choice of four matt textures, and colours comprise finely grained neutral

shades of quartz and granite, the granular nuances of recycled glass in tones of green, brown, white, black and grey, and a whole spectrum of blues. Transparent glass granules in bold colours enhanced with a pigmented polymer resin are designed to give an 'explosion of colour'. In this way, contrasting or complementary colours can be brought together in a design scheme using the same material at different levels or using splashes of colour in a muted scheme for an eye-catching contrast.

As well as interior settings, the non-porous surface makes it suitable for external use on shop fascias, swimming pool surrounds, outside living spaces and on building facades. The agglomerates are made using up to 70% recycled material, typically post-consumer glass and recovered natural spoil from mineral quarrying sites. They are Greenguard Children & Schools certified for the lowest levels of VOC emissions, and the eco-friendly characteristics can help architects and developers to obtain LEED credits on sustainable building projects.

□ Trend GB
United Kingdom
☎ +44 (0)800 044 5395
www.trend-group.com



Sculptural appeal

Graven Images of Glasgow has produced an eye-catching interior design for the Hotel Radisson Blu in Bloomington, Minnesota with the use of Krion® solid surface material in many of its spaces. The project was unusual because the hotel has direct access to one of the largest shopping and leisure malls in America, so the interior had to match the grandeur of the complex. Flanked by an escalator and staircase, the two-level lobby's walls are covered with triangular Krion® Snow White panels forming a geometric structure with great visual impact.

This leads guests to the entrance to the cocktail bar and restaurant, where reveals in Red Fire add drama. Light projected on to the panels also creates extra impact. The 100% recyclable material, developed by Systempool, part of the Porcelanosa Group, is made of two-thirds natural minerals with a low percentage of high-resistance resins. It is described as hardwearing, anti-bacterial and easy to clean and can be injection moulded, lending itself to a wide range of designs and projects.

□ Systempool
Spain
☎ +34 (0)964 506 464
www.system-pool.com



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Copper colours add depth and interest

As metal surfaces continue to be popular, De Ferranti has launched two new product ranges that demonstrate imaginative uses of copper and other metals in interiors. The splashback (below) is made of copper leaf and glass, by the Artistic Tile Company, and the innovative Treble pattern of 20 x 5 cm pieces fixed to a mesh backing can be used horizontally or vertically, and can also be supplied as a plain field tile.

The copper leaf is integrated into a protective glass layer, so these surfaces are suitable for both dry and wet area interior applications. The tiles are created by Italian artisans in an area well known for its glass and crystal production and are offered in two styles: Gloss Leaf, in which the leaves of copper are visible, with a subtle texture, and Antique Leaf, where the crinkles in the leaves have been tinted for an aged look.

These tiles are additionally available in silver and gold finishes, and the option of echoing the same mosaic pattern in another material elsewhere in the project is possible because the Treble pattern can also be created in stone or glass as well as other materials.

Drawing inspiration from the Middle East, a range of embossed metal tiles has been

added to De Ferranti's Alchemy collection. The new designs, a selection of which is shown below, include understated but elegant surfaces with a variety of patterns with names such as Arab Star, Jali, Ottoman, Octagon, Chevron, Flower and Polka Dot. These 30 x 30 cm tiles are designed to be suitable for a variety of situations in commercial and residential applications.

As well as the standard size and designs, bespoke tiles are available in a variety of sizes, finishes and patterns if ordering in quantity. For example, custom-made star-embossed tiles were used to dramatic effect by Hirsch Bedner Associates when ESPA created a luxurious spa in Istanbul. The 45 x 45 cm tiles in shades of brown and copper with a distinctive verdigris patina are featured throughout the reception area.

The brief was for a very contemporary look, which was achieved with these embossed metal tiles manufactured with traditional, artisanal techniques but offering a fresh, modern feel, as shown above.

□ De Ferranti
United Kingdom
☎ +44 (0)20 7384 4424
www.deferranti.com



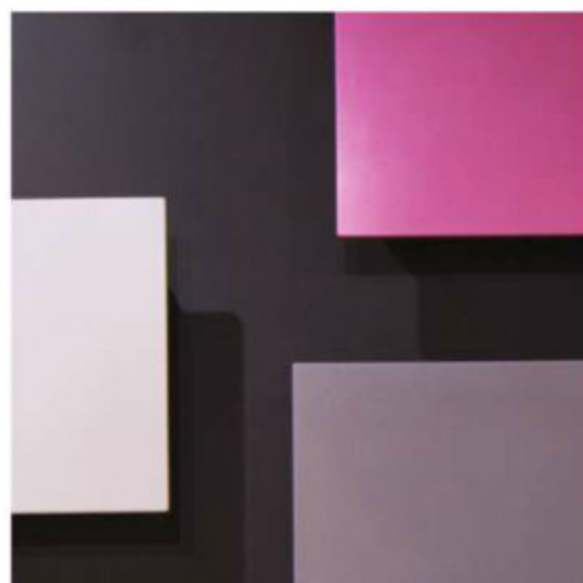
All that glitters

Five vibrant new colours have been introduced into the Hi-Macs® range from LG Hausys – unveiled in the UK last autumn, they will be fully available from the start of 2014. Strong tones and a distinctive glittering effect are the hallmarks of the colours in the new Sparkle collection, which is the work of designer Karim Rashid.

Some of the Sparkle colours are bold and statement-like, such as Key Lime and Kandy Pink while the more muted hues of Kreemy Grey, Kold Silver and deep, rich Kanada Violet offer a design juxtaposition that allows designers to mix and contrast colours within a single work, as the solid surface material can be invisibly joined.

Around 100 colours are now available in various ranges and thicknesses. The company says the new collection retains all the key advantages of this natural acrylic stone, being highly durable, colourfast and impervious to moisture, while its easy thermoforming characteristics allow the creation of any 3D shape.

□ LG Hausys
United Kingdom
☎ +44 (0)1892 704074
www.himacs.eu



Translucent finishes

Avonite solid surfacing is a smooth, non-porous and hygienic material that can be used for a wide variety of applications in domestic, commercial and retail interiors including wall cladding, countertops and shopfitting. The surfaces, which can be inconspicuously jointed, are claimed to be resistant to wear and tear, stains, bacteria, impact and heat, while being easy to maintain.

Amongst the collections are Studio, Foundations and Solid Surface Veneer, which between them offer a high degree of flexibility for designers and specifiers. Studio is a premium polyester-based material that can create signature looks for high-end projects, with superior levels of luminosity, clarity and depth to the designs compared to acrylic products, says UK distributor, IDS.

The 22 new designs in this range are inspired by precious metals and glass, and some of the translucent finishes can be backlit for a more dynamic appearance. The material is 12 mm thick and comes in a sheet size of 3,050 x 915 mm giving optimum flexibility for vanity units, wall cladding or work surfaces. Two of the neutral colourways, Cottonwood and White Sands, feature 40% recycled content.

Foundations offers 21 designs in acrylic solid surfacing, and is complemented by 15 designs within the Solid Surface Veneer range. This gives a choice of 3 and 12 mm thicknesses along with different sheet sizes, so that, for example, using a 12 mm veneer on a horizontal plane and a 3 mm veneer on the vertical plane can achieve cost savings without compromising on looks or performance. White, said to be the most popular colour of all with designers, is additionally available in 6 and 9 mm thicknesses.

□ Avonite
United Kingdom
☎ +44 (0)845 603 7811
www.avonitesolidsurface.co.uk



Embossed and embellished for a luxurious look

The newly launched Leonida collection of wallcoverings and fabrics from Harlequin is designed, says the company, to evoke a spirit of faded grandeur and distressed opulence. Vintage pieces and flea market finds have been translated on to a range of wallpapers and embossed velvets that would add a sumptuous look to a period design setting as well as offering a very modern-day edge and sleek contemporary appeal to open-plan living spaces and chic hotels.

The palette is understated, encompassing shades such as bronze, charcoal, pewter, antique gold, rose quartz, silver, parchment, powder blue and pearl. Soft and tactile, the velvets are fluid enough to drape well but also sufficiently durable to be used on upholstery. The mix of yarns within the four individual designs creates a movement of contrasting colour and texture.

Aurelia, used for the throw and seat upholstery below, is described as a majestic damask with a dramatic foil overlay, while Perla (arm, back and large cushion) is an antique-looking plain with a slight shimmer, in muted and jewel tones. Trezzini, used for the smaller cushion, features an aged mosaic effect, designed to appear both opulent and stylish. Lastly, Églomisé, as its name

suggests, is a distressed textured velvet with a unique églomisé appearance.

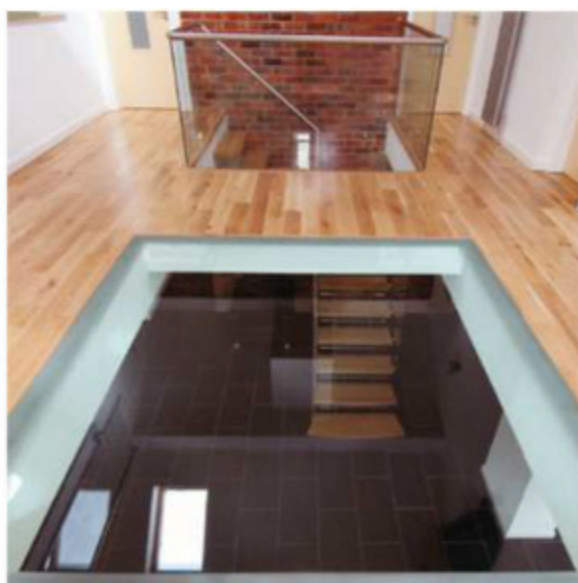
The wallpapers encompass eight designs over 45 colourways. Aurelia and Églomisé echo the fabrics of the same name, with the latter (below, right) said to be equally effective hung vertically or horizontally. Adella, a detailed paisley trail, features a combination of gravure and rotary printing techniques, resulting in a devoré velvet effect.

Inspired by a heavily embossed, antique enamelled screen, and translated in trompe l'oeil fashion, Akoa (below, left) is printed on to foil, and layered with ink to achieve an opaque effect. Demi, a classic scalloped motif, has a small beaded medallion in the centre, while Comice resembles an open-fretwork linked trellis, and is embellished with minute glittery beads. Florentine, described as a dramatic oversized ogee, is also enhanced by beading. Finally, Medina features a lacy roundel with a Moorish influence and combines metallics with a muted overlay to subtle effect.

□ Harlequin
United Kingdom
☎ +44 (0)845 123 6805
www.harlequin.uk.com



Glass



On the kitchen front

The Frinton Glass design in the Quantum Kitchens range by System Six is described as the ultimate in contemporary kitchen frontals, and these attractive glass doors are an innovative alternative to painted, acrylic or laminated gloss door styles to give a streamlined look to the kitchen. Ten standard colours are offered, including Pearl Blackberry (below), Bronze and Warm Blue, and they can also be supplied in custom colours. The cabinets feature a handleless J-grip design but can be factory drilled to accept handles if wished. The range is also available in made-to-measure sizes and the company offers a 25-year warranty, minimal delivery times and a cabinet structure that is described as robust and rigid.

□ System Six Kitchens
United Kingdom
☎ +44 (0)1392 255150
www.quantum-kitchens.co.uk

Clearly elegant features lift design schemes

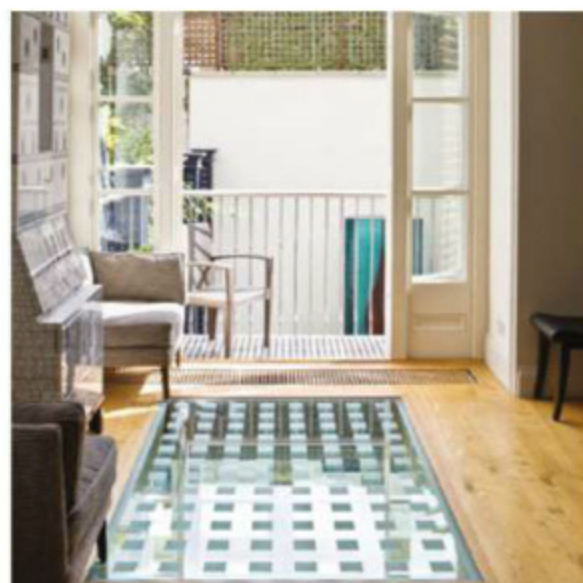
Bespoke staircase company Bisca was commissioned by Crowstone Developments to create a statement staircase for the new Rolex store in Leeds, West Yorkshire. To meet the brief for this prestigious location, a semi-helical staircase was created entirely of glass which gives the illusion of floating (seen below). A low-iron laminated glass balustrade follows the outer curve of the stair and is capped with an elegant bronzed handrail. The reduced iron content of the glass gives it a very clear, pure look.

The new store is only the third standalone Rolex outlet in the UK, the others being in London's Knightsbridge and Bond Street. The interior is designed to create a luxurious shopping experience for its customers and features double-height ceilings, a library and even a champagne bar. Said Bisca design director Richard McLane, "Fixings were an integral part of the design and all visible

metalwork had a specialist bronze finish, in line with the Rolex brand – attention to detail was crucial."

Another example of an opulent staircase and balustrade by Bisca is shown below, "Glass is a fantastic material," said Richard. "It has a light, ethereal aesthetic so that you can create staircases which appear to float – architecturally, that's a stunning effect. But, although it's seen as such a 'modern' material, using glass does not dictate that it has to be a contemporary staircase. I've just completed one with traditional risers and treads all in glass over a waterwheel in a converted mill." The company also designs glass floors, two of which are seen above.

□ Bisca Staircases
United Kingdom
☎ +44 (0)1439 771702
www.bisca.co.uk



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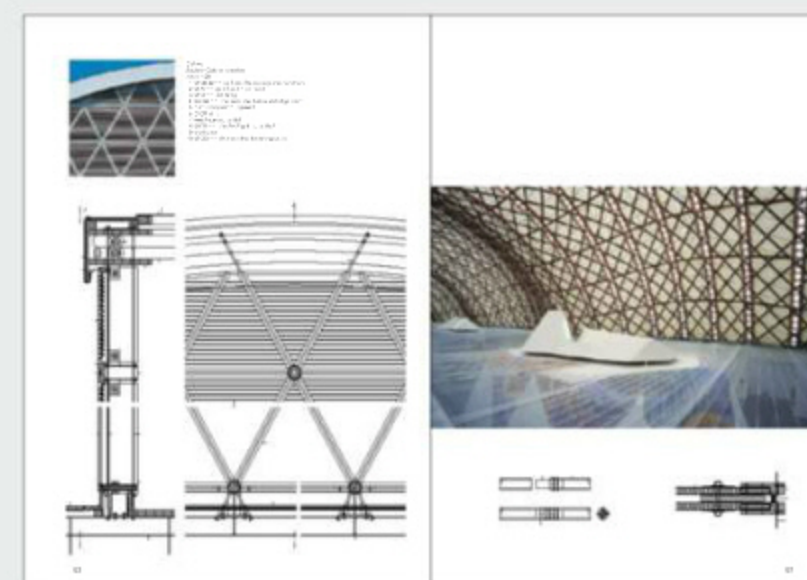
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Materials, sensuality, aesthetics – the emotional facets of an exterior

It links outer and inner spaces, protects against the effects of weather, and certainly promotes lowering of a building's energy needs. More than ever, the exterior is becoming the testing ground for novel applications of new materials – especially aesthetic surfaces. These days, the diversity of demands placed on the exterior by far surpasses the requirements covering other building elements. The design of an exterior has become a complex challenge. We addressed this challenge in the second en-

larged edition of "in Detail Building Skins". The volume delves into a multitude of innovative projects covering a span of exceptional exteriors to intelligently optimized facades, a catalogue of materials lists current products and their applications, and technical experts clearly describe and illustrate the potential of energy-efficient exteriors. Packed with information indispensable for designers and architects alike, this new edition is sure to become the reference book on building exteriors.

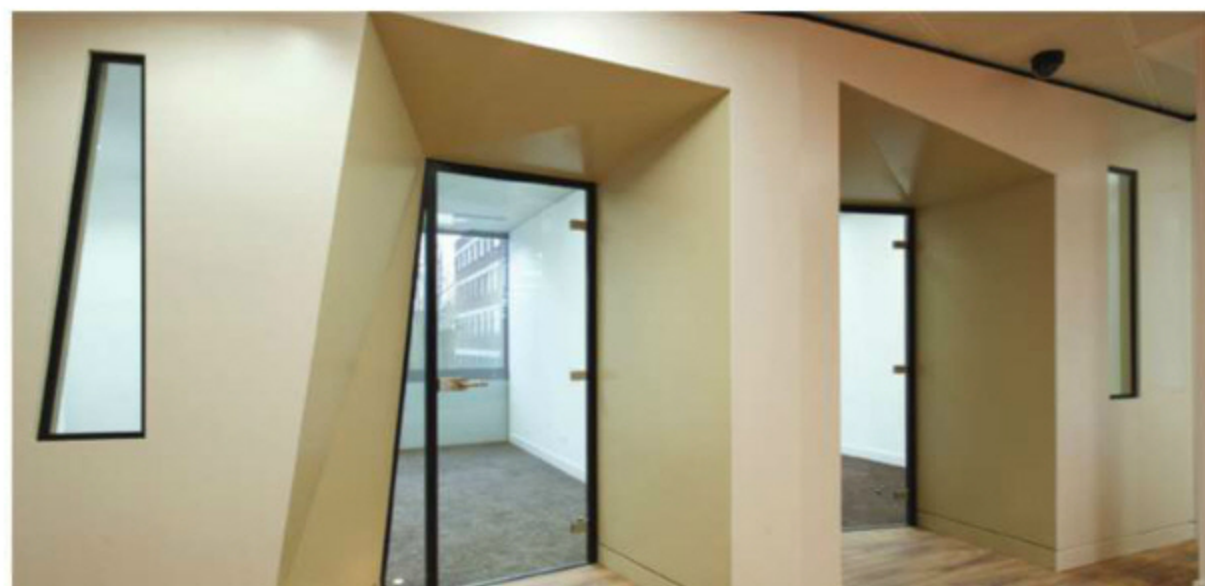


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Helping to shape the work environment

Creating a vibrant space to cater for a varied mix of working methodologies amongst awkward building angles was the main brief for a two-storey fit-out of Geneity's Hammer-smith offices. This specialist software provider of e-gaming products wanted a space that was modern and featured distinct working and breakout areas. The main challenge was the building's difficult angles. For architect Julie Heron of Barr Gazetas it presented an opportunity to make the most of the existing unusual design.

The result was private office spaces with uniquely shaped walls, and specialist partitioning manufacturer Komfort was chosen to produce sections of shaped glass that would slot in next to wooden panels in each of the offices, as above. This created, in the architect's words, 'monolithic elements' that work well within the whole environment.

Polar range single glazing was used with black aluminium channels. To complement this, full-height glass doors, also from the Polar range, were installed in each office. Whilst this glass and wood effect runs throughout the working office space, Geneity wanted a different ambience for the breakout areas, introducing more colour and funkier furniture. Said Komfort's Franz

Lorenschitz: "The complexities of this installation presented us with an opportunity to showcase our ability to come up with solutions that meet the very specific demands of our customers and end users."

Komfort's partitioning has also been used to create a unique office environment for IT service supplier SoftCat's new HQ in Marlow, Buckinghamshire. Spread over three floors the 26,600 sq.ft of space required several bespoke elements involving glass partitioning and manifestation.

The largest element to the project was the creation of a meeting room with a faceted curved wall, seen below left. This was constructed using Komfire solid elements to create a 600 mm-thick wall with a large opening and curved ends. Within the opening a faceted, single-glazed partition was installed with curved abutments. Komfire 75 and 100 glass partitions were supplied for several private meeting spaces, and other products included Polar single glazing with glass doors, walnut-veneered and white laminate-faced doors and a sliding glass door that marked the entrance to an informal meeting area.

Komfort has revamped its own London showroom to provide architects, designers and developers with an 'inspirational space' showcasing its wide portfolio of products in office set-ups, to show how different configurations and materials contribute to space design. Integrated and complementary products for office, commercial and education environments are on display including glazed, solid, acoustic, demountable and fire-rated partitions, glass and veneered doors, storagewall, a structural glass staircase and movable walls.

□ Komfort
United Kingdom
☎ +44 (0)1403 390300
www.komfort.com



Adaptable style

Keir Townsend has designed a bespoke staircase with a balustrade that utilises strands of chiffon between laminated glass sheets, which acts as a divider but also lets light flood through. The metal fixtures that join the polished concrete stairs allow for the glass panels to be changed quickly and easily to alter the look if occasion or seasonal atmosphere should demand it. The fabric can be altered, too, making the possibilities for custom-designed panels almost limitless, says the company – whether ephemeral and floaty, as with the chiffon in various shades, or glimmering with metal foils to add character to any scheme.

Recycled glass surfaces are available from Keir Townsend in a choice of colours (below is aquamarine), which can be used to effect in a variety of situations, including kitchen worktops, vanity units, shelving and splashbacks. Because of the material's translucency it can be lit from underneath to create a display feature. The glass surfaces are 20 mm thick and can be cut into custom sizes of up to 3,060 x 1,440 mm.

□ Keir Townsend
United Kingdom
☎ +44 (0)20 7746 2442
www.keirtownsend.com



Fireglass solution

A comprehensive fire-resistant glazing specification has been delivered at a state-of-the-art learning facility in the West Midlands by Fireglass UK, an approved installer of the Pyroguard range of fire glass solutions. Dudley Evolve is a new centre at Dudley College and is designed to engage with the local community as well as to provide a modern learning environment. It incorporates a number of high-level leisure facilities such as a fitness suite and sports hall.

To achieve compliance with the relevant fire safety and acoustic regulations in education a range of EI rated products was used, and these included EI 60 at 23 mm, which offers an acoustic rating of up to 40 dB. The range is designed to provide full integrity with insulation performance and high levels of sound reduction. Carrying out fire glazing works throughout all areas, the installer fitted Pyroguard into a wide variety of screens including hardwood timber, steel and timber secondary screens to curtain walling.

It managed the complete supply and fit programme against an accelerated six-week installation period. Sean Haynes, managing director of Fireglass UK, commented: "The complexity and combination of screens and glazing products on this project demanded a closely co-ordinated approach. Effective planning ensured we were able to finish our work within the specified time frame but, equally importantly, to the highest quality standards."

Pyroguard is manufactured by CGI International, which offers the full range of E, EW and EI rated fire glass and states it has extensive test evidence to support the use of these products in all timber, steel, aluminium and partition applications.

□ CGI Pyroguard
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☎ +44 (0)1942 710720
www.pyroguard.eu



Opera house facade reflects the old in the new

The Mariinsky Theatre in St. Petersburg in Russia is one of the most famous opera and ballet theatres in the world. Now this historic building, which dates from 1860, has a new addition and the two are connected by a pedestrian bridge over the Krukov canal. With its generous use of glass, the striking panoramic facade of the Mariinsky II opera house prevails not only from a functional perspective, but also plays an essential design role: the glazing gives an unrestricted view across to the original theatre, which in addition is reflected on the facade, resulting in an interrelationship between old and new.

The auditorium is the heart of the new building with its 2,000 seats in a classical horse-shoe shape. The three balcony levels are unusual as an opera house of this magnitude would more usually have five levels, but the use of just three tiers allows for more height between them and creates better sound dispersion, especially for the rows located farther back.

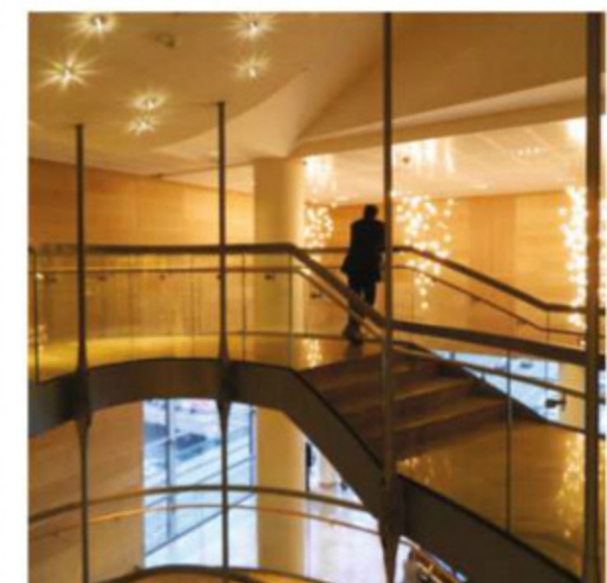
Covering around 79,000 m², the opera house has enough room to take a stroll and enjoy the surroundings, with a large foyer area and a suspended staircase covering several levels bathed in warm light. The large panoramic glazing of the formal, sim-

ple structure has an inviting effect allowing a great deal of daylight to enter and giving an open and spacious atmosphere.

Schollglas GEWE-safe® composite safety glass was chosen for this facade, which also features around 1,300 m² of GEWE-therm® sun protection glass. The highly selective thermal protection coating is placed on the outer pane of the gap between the panes, reflecting the incident sunlight to prevent excessive heating of the building and ensuring a pleasant climate on the inside. The company says this combination of sun protection and safety expands the design flexibility considerably, and makes it possible to have large-scale glazing of buildings with high utilisation of daylight.

Another 314 m² of high-tech special glass was used in numerous window elements as well as for overhead glazing. The building was designed by Diamond Schmitt Architects of Toronto, Canada in association with KB ViPS Architects from St. Petersburg and German acoustic specialists Müller-BBM.

□ Schollglas
Germany
☎ +49 (0)5105 777-0
www.schollglas.com



Facades



Restaurant redesign lets the light in, and gives a window on the animal world

ZSL London Zoo's main restaurant has been transformed by remodelling and extending the 1920s building to meet the growing needs of visitors. The new design, by architects and interior design consultants SHH, also had to work as a venue for special events, while maintaining the architectural quality of the original John James Joass building. The Terrace Restaurant's capacity has nearly tripled, to 700 covers, whilst the building's footprint has increased by almost 1,000 sq.m, to include two large terraces and an increased mezzanine floor area. The overall feel is clean, raw and urban in glass, timber and exposed brick with steelwork columns. Schueco FW 50+ SG was used for the glazed curtain walling and skylights.

The original building was made up of ground, mezzanine and first-floor spaces, encompassing a staff canteen and offices, in addition to the restaurant and kitchen. A 1960s, single-storey, timber frame extension at the front had allowed for increased visitor numbers, but was not adequate to cope with current demand. "The original building was relatively simple," commented Brendan Heath, SHH associate director and project leader. "Its most significant feature was a series of double-height arched windows, which had been covered over in the course

of the 1960s extension work, with the addition of a flat roof structure leaving them half inside and half outside the building."

The extension has been demolished and a new, tiered extension created to the front of the building. This has increased the ground floor area with a 6 m double-height space at the front and new stairs up to an expanded mezzanine level with a generous deck and a smaller first-floor terrace directly above. The suspended ceilings were ripped out and the building taken back to its original structure, revealing three of the five arched windows, which now link the new extension to the ground floor space as a connecting feature, visible from the exterior.

Outside seating is part-canopied by the building's overhang in quartz-finish Parklex Facade for maximum solar shading. This high-density panel product has a resin-bonded fibre core faced with natural wood, and was also used in a copper finish for the rainscreen cladding. The south-facing, full-height curtain wall glazing to the front of the extension is punctured by six 2.5 m doors. At the top of the doors, a feature grille in anodised matt aluminium takes the eye from the plasterboard of the ceiling above. The grille is also featured along the edge of the

mezzanine floor plate as a means of minimising its visual bulk. At the centre of the glass front to the extension a double-sided kiosk offers a barista coffee bar and bakery products. The top folds upwards on opening to create a canopy that, when closed, looks to disappear into the building.

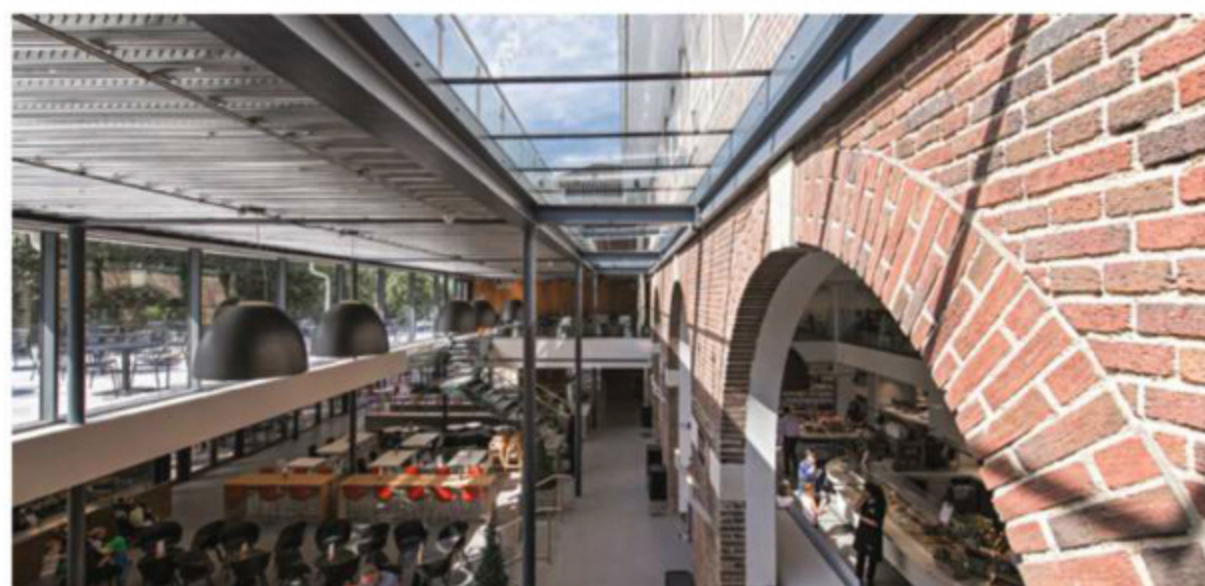
Said Brendan Heath, "Because of a slight fall away between the front of the existing building and Barclay Court [the landscaped area in front of the restaurant] we wanted to avoid a step upwards or any other barrier to entry and so created the necessary even-ing-out within the extension itself, with several steps up to the food service area, together with two ramps for wheelchair and buggy access. Clear means of access and circulation, which the old building lacked, were key in determining the design."

Steel-framed, cantilevered stairs with glass balustrades for an open feel lead up from both sides of the ground floor to the extensive mezzanine seating area and the terrace beyond, offering views down on to Barclay Court and the new penguin enclosure. External deck-mounted lighting washes over the terrace when the lights are low or when the building hosts evening events. The first-floor terrace, belonging to the hire-out Prince Albert Suite (the interior of which was outside the brief for the new building) is set back and offers 215 sq.m of space, with a glass balustrade protecting the Schueco skylight at its rear edge.

□ Parklex UK Ltd
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□ Schueco UK Ltd
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Kilden Theatre and Concert Hall, Kristiansand/Norway – Design of the grand gesture

The four young Finnish architects who in 2006 won the international competition held by the Norwegian city of Kristiansand and the Southern Norway Region to build the Kilden Theatre and Concert Hall, had no comparable experience to point to. Despite this, the public sector clients decided to place their trust in them, marking the beginning of ALA Architects.

From the very beginning it was clear to all the project partners that the implementation of the arrangement of folds in this grand gesture would be problematic. But the daringly curved structure did justice to the ambition of the clients to introduce the process of changing the monofunctional industrial area on the quay front in South Kristiansand into an extensive leisure and recreation zone with the help of the performing arts. The cultural building, visible from far out at sea, opens to the water with a full-height glass frontage, which appears to be cut into the wide funnel-like opening of the facade and gives the wave-shaped undulating local oak cladding further conciseness through its upper curved termination. The facade, with its regular grid and large-format panoramic glass panels, creates complete transparency, giving an unobstructed view on to the harbour with its ships and cranes and con-

necting internal and external space almost seamlessly. The realisation of the glass facade – standing freely in some parts up to a height of 16 m – proved to be just as challenging as the parametric construction of the oak-clad facade soffit. The know-how and skills of the Jansen AG construction department were required from an early stage. In addition to the innovative technological facade solution provided by the new VISS Ixtra, the company also contributed the necessary knowledge and ability to allow the detailed design to progress in this highly integrated development of a challenging architectural solution.

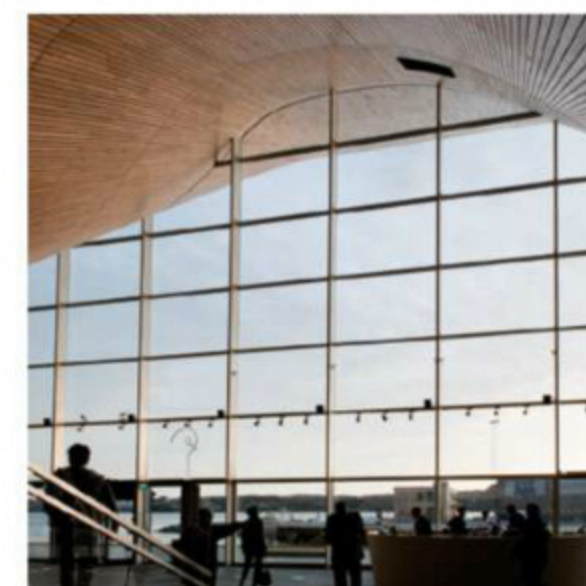
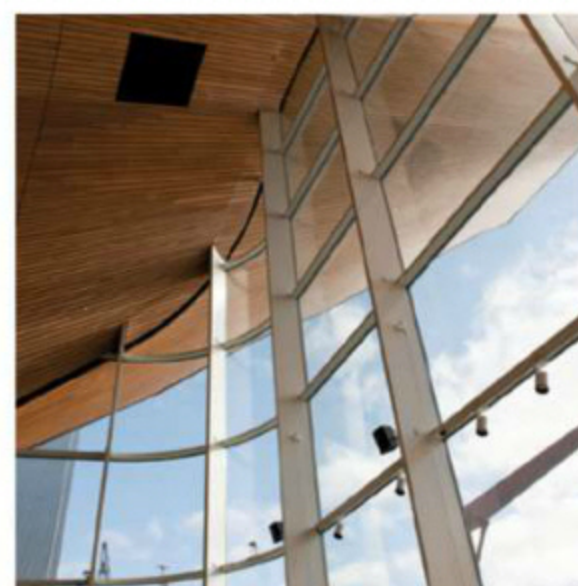
The architects had made use of parametric computer programs during the competition phase in order to prove that the wave-form wooden facade soffit could be built. The curving shape is generated by the connection of the curved intermediate wall of the ground floor with the straight roof edge.

The glass facade of the Kilden Concert Hall is a pure architectural solution, which can only be realised with steel profiles: extremely high wind loads occur because the facade looks directly out to sea. Laser-welded special profiles were used to meet the very high structural engineering require-

ments in the most efficient way possible. A further structural engineering challenge was the critical aspect of lateral-torsional buckling: here as well, a special structural solution was only possible using additional steel angles. The profile depth is 500 mm, but the face widths are only a slender 60 mm with a wall thickness of up to 20 mm, which varies to suit the structural requirements, depending on the unrestrained member length. Individual profile dimensioning allowed materials to be optimised and therefore ensured the high economic efficiency of the whole construction. The profiles could be supplied cut to length (optimisation of the cutting costs), which also contributed cost savings. The Norwegian joinery company involved from the beginning was one of the pioneers of CNC wood processing but had no experience whatsoever in curved construction. On the other hand, this was exactly the area of expertise offered by the Swiss firm design-to-production which created parametric models of the various constructions. In these models, every individual component is defined in three dimensions, including all the connection details. Then the structures are analysed by the structural engineer and the individual elements produced on computer-controlled machines.

In October 2009, the exact shape of the facade was so precisely defined that its 126 elements could be efficiently prefabricated. The data for the 14,309 components was produced on the Swiss company's computers and transferred digitally directly to the production floors. The final element was put in place on 14 December 2010. With that, a year of close and excellent co-operation between Norwegian and Swiss construction specialists ended, without which it would not have been possible to realise this complex, challenging geometry.

□ Jansen AG
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www.jansen.com





One system suits all configurations in new school

Technal's aluminium glazing systems have helped to create a distinctive new school campus for secondary education in Bridgwater, Somerset. Chilton Trinity School was designed by architects Scott Brownrigg and constructed by BAM. The design and layout of the scheme were driven by the aim of transforming the educational agenda and creating a clear sense of place and identity that will inspire and elevate the experience of students, staff and future generations.

The building concept revolves around the curved form of the 'hive' – a central, multi-functional venue that sits prominently within the glazed entrance atrium. The school is separated into teaching 'federations' radiating from the centre, so the space can adapt to a variety of teaching and pastoral environments and has an attractive campus feel. Corridors have been avoided by re-using the spaces for informal breakout areas.

A key part of the design brief was to ensure high levels of natural light, and Geode-MX Visible Grid curtain walling was used on every elevation to achieve this – for the full-height entrance atrium, teaching spaces, breakout areas, and for the swimming pool and sports facilities areas. Top-hung FXi65 casement windows naturally ventilate the

school and have been used as ribbon glazing, inserted into curtain walling in the main entrance facade, and in composite configurations of up to five units to create large bays for the classrooms in each of the three curriculum wings. There are also some single windows to the office areas.

Geode-MX roof glazing encloses the atrium and automatic actuators were fitted to open the windows in the vertical entrance facade when required.

Commenting on the project, Scott Brownrigg project director Oliver Thomas said, "From a design perspective, we wanted to use one system in a variety of locations and configurations without the need for any adaptation, and a product that would give us repetition, consistency and ease of fabrication and installation. As a glazing solution, aluminium is low maintenance, slim, light and robust making it ideal for a demanding secondary school project. The finished scheme looks unique and distinctive and has been very well received."

□ Technal
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www.technal.co.uk



Robust cladding

Cladding panels from Steni UK feature on the redeveloped City School in Sheffield, South Yorkshire. Some 3,000 m² of the fibre-glass-reinforced polymer composite 7 mm Steni Colour panels in eight shades have been used on the facade and main entrance soffit of Phases 1 and 2 of the £22 million Building Schools for the Future (BSF) project. The main contractor was Vinci Construction UK.

Phase 1, the new build element, incorporates a learning resource centre, dining hall, main hall and visitor reception as well as maths, science, ICT and humanities classrooms. Phase 2, comprising part refurbishment of the existing buildings, involved stripping back to the original steel structures and high-level stone cladding and installing new envelopes. The redeveloped school is designed to be 'inspiring to all', including the local community, which has access to its facilities after school hours, and students were involved in looking at key factors in the planning process.

The robustness of the cladding panels was a key consideration in their choice and they have helped to meet the architect's design for the colourful exterior of the redeveloped school. The lightweight panels feature a smooth surface of 100% acrylic that is electron-beam cured without the use of solvents, and they have been installed in long horizontal and vertical bands in a mix of the eight colours by specialist sub-contractor NG Developments.

The rainscreen element used structural adhesive on to an aluminium sub-structure and the remainder was made up into Steni-faced composite panels and glazed into a low-rise aluminium glazing system.

□ Steni UK
United Kingdom
☎ +44 (0)1978 812111
www.steni.co.uk



Bollinger + Grohmann

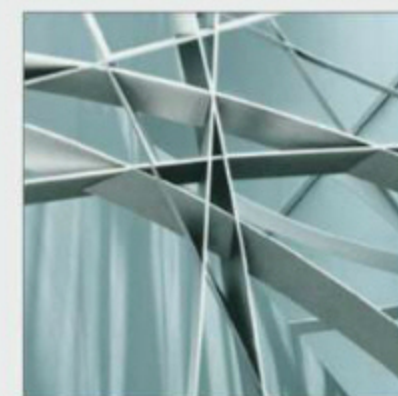
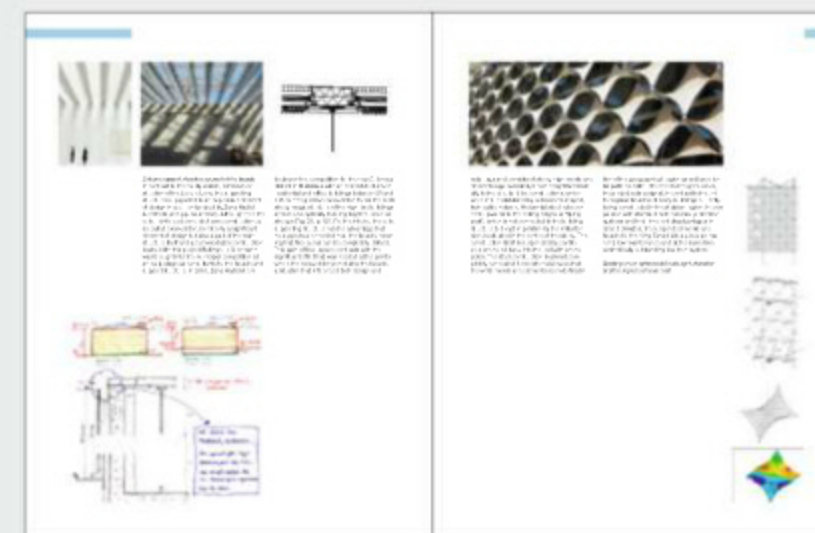
NEW June 2013. Christian Schittich, Peter Cachola Schmal (ed.), 144 pages with numerous drawings and photos. Format 23 × 29,7 cm. ISBN 978-3-920034-88-1. Hardcover: € 49.– / £ 40.– / US\$ 69.– + postage/packing + VAT, if applicable
DETAIL engineering series

Potential for optimisation by integral planning approach

For the engineers of Bollinger + Grohmann, it is of central importance to understand design and construction in the planning process as a unit. That is why they see their task as further development and reinforcement of the respective design: in dialogue with the architects and other technical planners – and not least through their knowledge of how to design load-bearing structures. In order for innovative structures to be created, their genesis cannot be based just on structural and mechanical principles, but is instead the product of experience with materials, construction methods and technologies.

This examination of interdisciplinary topics, as well as an open and interested consideration of adjacent disciplines, led to the development of an integral planning approach that allows the office to react to the wide range of requirements of worldwide projects.

The many spectacular constructions of recent years speak for themselves: The limits of feasibility seem to no longer apply, mathematical laws are assigned a new dynamism, and common structures are newly interpreted.



The building envelope as a load-bearing structure: Possibilities of modern façade planning

Building to last: Engineering for preservation of historical monuments

Structural planning and sustainability: Potential for optimisation through integrated planning approaches

Geometry development, parametrics and generation: A paradigm shift in planning

Presentation of the construction process in its different planning phases based on selected projects

www.detail.de/e-bg



Innovative design in three dimensions

Spanish tile manufacturer Apavisa has recently completed a 3D facade project in Uruguay for the furniture and accessories brand Vivai in the resort of Punta del Este. The architect for the redesign of this 7.5 m cube building was Ruth Braun and the tile design specified was the Nanoevolution Curve from the Archconcept range, a varied collection of reliefs and surfaces with stone, metal and concrete effects.

Selected in a 15 x 60 cm format, the Curve tiles provide insulation for the construction, whilst also presenting a 3D effect for a striking aesthetic. The newly introduced Archconcept collection is a high-tech porcelain tile line featuring a variety of unusual forms, including hexagonal, raised, curved and wave shapes.

All these designs are created using a hand-finishing process for maximum variation, and the company describes the result as an inspired collection of remarkable reliefs and textural surfaces. The Nanoevolution tiles are intended as a further step in the search for new materials applied to architecture and interior design, looking for simplicity, originality and style. The neutral colours, along with a wide selection of large formats, are said to make them easy to tailor, com-

bine and apply to a range of schemes and projects. To complement the decorative approach of the collection, 3D tiles in different heights are combined with brick mosaics and various colours and shades including white, grey, anthracite, black and moss.

The full-body porcelain tiles are suitable for interior and exterior walls and ventilated facades, with a decorative versatility allowing for customised applications in all types of settings, states Apavisa. The company says it is dedicated to the manufacture of extremely high-quality porcelain stoneware based on the latest manufacturing technology and research into current demands in architecture, with the aim of enhancing the role of quality, durable porcelain for both interior and exterior use.

The porcelain tiles are distinguished by their technical characteristics including features such as micro-sealing, mono-calibre, high bending resistance (61 N/mm²), very low water absorption (+/- 0.1 %), and resistance to frost and surface wear.

□ Apavisa Porcelanico SL
Spain
☎ +34 (0)964 70 11 20
www.apavisa.com

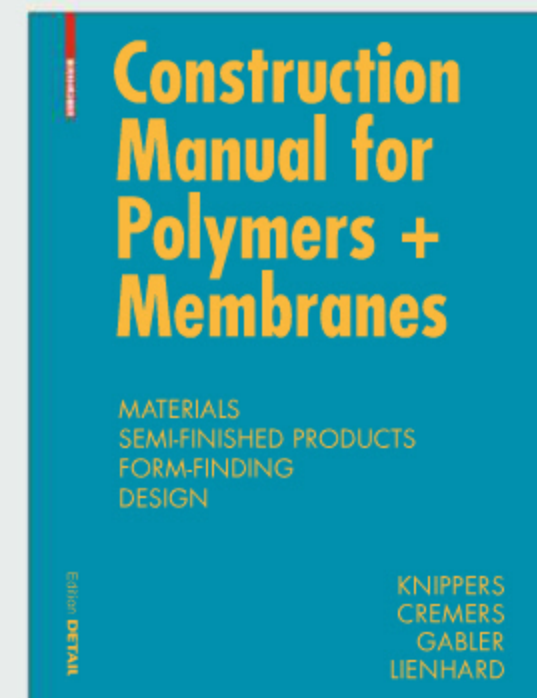


Warm welcome

In the 2013 Brick Development Association (BDA) Brick Awards, winners of the best housing developments for 1 to 5 units, 6 to 25 units and 26 units or more all featured bricks from Ibstock. The largest was the Royal Road, London scheme (above), by Panter Hudspeth, using Ivanhoe Cream and Ivanhoe Athena Blend. The judges commented that the overall feeling and quality is humane and approachable and that, while the design is modern, the clever use of brick detailing gives a warmth and colour which fits in well with its surroundings.

It was the first year of the BDA Chairman's Award, which is outside the judging panel and is in recognition of a project that fulfils a need the chairman considers important. The winner, Hammond Court in London by Mae Architects, used Chelsea Smoked Red and Oakthorpe Buff bricks from Hanson. The chairman said the warmth of the brick and the central courtyard create an attractive outlook for the residents, and the project is modern in its language with gables and good detailing from the surrounding streets.

□ Brick Development Association
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www.brick.org.uk



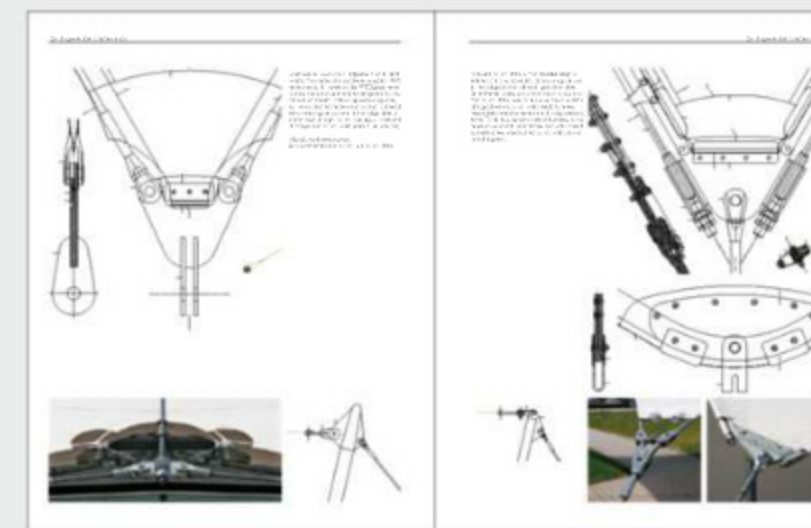
Construction Manual for Polymers + Membranes

2011. Jan Knippers, Jan Cremers, Markus Gabler, Julian Lienhard.
296 pages, including numerous pictures and drawings. 23 x 29.7 cm. Paperback.
ISBN 978-3-0346-0726-1
€ 89.95 / £ 72.- / US\$ 125.-
+ postage/packing
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DETAIL Construction Manuals

The basics of construction with synthetic materials

Whether as translucent tiling, wide-spanning membranes, air-filled foil cushions or in organically curved form: Plastics are used in architecture in the widest variety of forms and application areas. Innovative technical developments constantly improve their material properties. Plastics today are an alternative to be taken seriously in the building trade, whether they are used in the supporting structure, roof, facade or interior

furnishings. The "Construction Manual for Polymers + Membranes" returns to the basics of the series by addressing an individual building material. From the material properties to the requirements for drafting and construction, it encapsulates well-founded and comprehensive expertise in familiar DETAIL quality. Selected project examples complete the reference work and make it indispensable for day-to-day planning.



Historical development of plastics and membranes in architecture

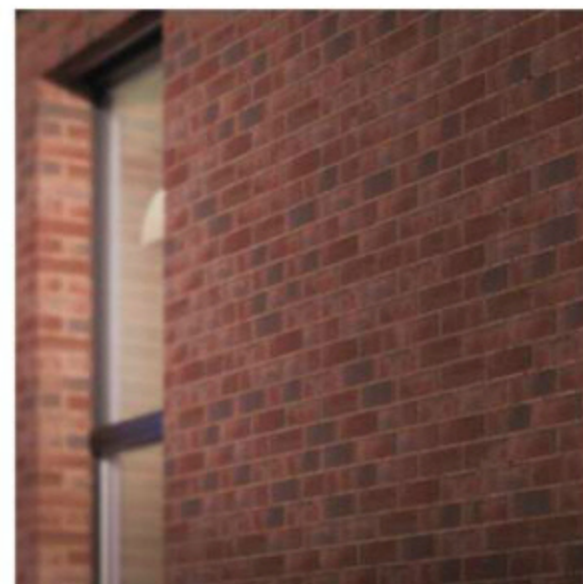
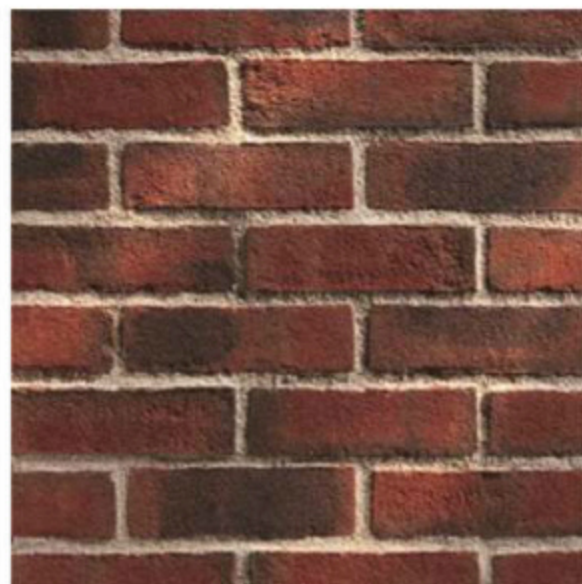
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Precise descriptions of materials and semi-finished products

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www.detail.de/cm-polymers



Brick manufacturer's house concept is based on a fabric first approach

Wienerberger's e4 brick house™ concept, which has been designed to demonstrate the future of affordable, sustainable housing in the UK, makes full use of the company's building products, solutions and innovations, including a wide choice of brick types for the external walls. In conjunction with Arup, the design for a two-storey, three-bedroom detached home (above) has been fully developed from the complete design down to individual product costings.

It is described as a unique archetype that directly addresses the UK market need, and the aim is to engage and inspire architects, housebuilders, developers and homeowners. It uses a fabric first approach: by maximising the natural properties of clay bricks, blocks and roof tiles, and combining this with the latest in construction innovation, the true environmental value and performance of the e4 house is permanently embedded in the building fabric, states the company.

Whilst any bricks from the portfolio can be used for the facade, the Chartham Multi Stock brick (above, centre) is suggested as a good option to give the deep colour and rich texture to suit the building, with Broadway Dark Multi as the complementary brick for the external bin store. Below, left is Old

Weatherfield from the wide range. The brick bond will take inspiration from the patina and the techniques articulated throughout the UK's architectural heritage, says the company, and alongside the choice of brick will create a facade that references the past but creates a modern look. The bond recommended will be Stretcher Bond, although there is scope for a number of variations in the specifications, including English Garden Wall Bond on the gable end.

The internal walls will be constructed from the Porotherm clay block walling system, a precision-engineered block that is equipped for loadbearing and non-loadbearing applications with an interlocking design that eliminates the need for mortar in the vertical joints. Claimed benefits include the fact that it saves 95% of typical water usage, allows the wall to dry up to a third quicker, and can also be laid faster than traditional masonry.

The roof is adaptable to a variety of different tile profiles in the Sandtoft range, and aims to make the tiles a key aesthetic feature of the house. This is a result of a special design, with the gable wall terminated in a one-and-a-half brick parapet protected with a ceramic metal coping. The parapet frames the tiling area, obscuring cut edges and em-

phasising the character and prominence of the tiles. The suggested product here is the New Generation Cassius range interlocking clay tile in Antique Slate colour option.

The e4 concept is named according to its four founding principles of economy, energy, environment and emotion. The intention is to provide a house that addresses the following criteria: meets market demand, is financially affordable and accessible, and gives optimum build performance; meets current energy standards and continues to offer a sustainable environment for its life cycle of 150 years plus; minimises its environmental impact, is responsibly sourced and meets Level 4 of the Code for Sustainable Homes as standard; and provides flexibility, quality and practicality, as well as allowing for a higher quality of living. The company welcomes enquiries from those who would like to discuss turning the concept into a reality.

Wienerberger says the house is designed to be adaptable to the varying needs of homeowners, from households with or without children, to older residents. For example, depending on the target demographic, an en suite room can be easily incorporated, as can extra bathrooms and alternative bedroom configurations.

For growing families, the loft space is ready prepared for conversion, creating an extra 20 sq.m of potential living space for the minimum cost, and allowing the house to grow in tune with its residents' needs. The roof will have a 40° pitch, and space will be provided within the machine manufactured roof trusses, with the pitch angle creating sufficient vertical height to allow full conversion without the need for dormers.

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www.wienerberger.co.uk



Solid masonry walls

A four-bedroom family home in Bourne End, Buckinghamshire has been constructed with H+H Celcon Blocks Standard Grade and Celcon Foundation Blocks with traditional mortar. The house was built by Chris Page Building on the site of the client's previous dwelling, a bungalow, which has been demolished to make way for the new build.

The key requirements for the house, which features solid masonry internal and external walls, were that it should offer low energy consumption and high levels of environmental comfort. Celcon blocks were specified primarily because of their inherent thermal qualities and ability to aid in the controlling of room temperature.

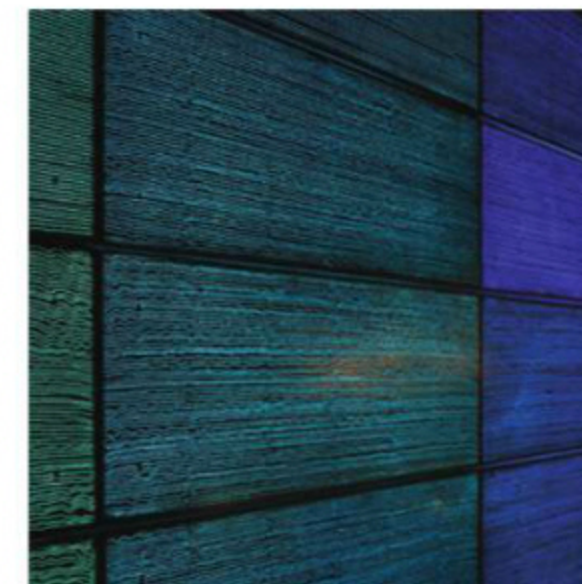
To further improve the energy efficiency of the building, the external walls were finished with 100 mm external wall insulation above the dpc and 80 mm below. This resulted in a minimum U-value of 0.24 W/m²K and a 'B' rating in the Energy Performance Certificate.

Being of a relatively high thermal mass, the blocks help control temperatures by absorbing heat during the day and releasing it at night, creating a comfortable internal environment in the building.

Said contractor Chris Page, "This was the first time I had built a house with external wall insulation, although I am very familiar with blockwork building. The single skin went up very quickly and I am very pleased with the end result."

The client commented that, despite being bigger than the bungalow the family had previously lived in, they find the property uses less energy, and they are enjoying the comfort of their new home.

□ H+H UK Ltd
United Kingdom
☎ +44 (0)1732 880520
www.hhcelcon.co.uk



Interactive display lights up as it gets dark

The world's first media facade that features Lucem light-transmitting concrete has been installed at the RWTH Aachen University in Germany. The technical university is a leading European scientific and research institution and forms an appropriate setting for this new technology, which the company describes as a milestone in the innovative design and realisation of ventilated facades.

In contrast to other materials, concrete does not obviously appear to be suited for translucent constructions, says Lucem, but it can now be produced as large-scale concrete panels containing optical fibres for use in a variety of applications. The serial production of the material also means the cost per square metre is said to be roughly equivalent to that of stone. At the same time, it has developed a special light source, in the form of flat LED-based building industry-adapted elements, which allows an energy- and cost-efficient solution for media facades, with a price point comparable to glass facades.

Designed by architects Carpus & Partner of Aachen, the new university building features the Lucem-LED-RGB Lightpanel system with DMX control so its facade becomes a media platform for interactive light display. There are 136 panels each measuring 150 x

50 cm, forming a facade area of 30 m wide x 4 m high. The panels carry a content of 3% optical fibres inside, which transmit the light through the concrete. Employing colour-changing technology, each panel can be lit with one of 16 MIO (Micaceous Iron Oxide) colours that become brighter with the reduction of daylight. During the day, therefore, the panels appear simply as an elegant natural stone cladding.

Each panel is accompanied by an LED light panel of the same size and these are controlled with an internet-based DMX technology. The light panels contain a red, a green and a blue channel that can be activated in 255 steps from 0 to maximum light. In total, 408 channels are controlled simultaneously to make the facade become a display.

With the use of special software, the light shows can be operated via the internet or even with a mobile phone. Single colours can be displayed, as well as interactive elements like the Tetris game, and the facade can also be used to display text and logos.

□ Lucem GmbH
Germany
☎ +49 (0)2402 124 66 94
www.lucem.de



Insulation



Ready-wrapped panels

DuPont™ Tyvek® FireCurb™ Housewrap has been installed into the building envelope of the Lerkendal Hotel and Congress Centre in Norway in the form of 'ready-wrapped' and sealed panels, built off-site as separate elements. The company says the new product adds superior flame-retardant performance to Tyvek's long-term weather protection, effective vapour diffusion and energy-efficiency properties. It potentially limits or stops the spread of fire through the external envelope by reducing the flammability of polymer-based substrates.

A phosphorus-containing agent promotes the formation of a 'char' layer at the surface when it is in contact with an ignition source. This thin layer of carbonised polymer is highly flame retardant and forms a barrier, slowing the release of flammable materials into the fire. Starved of fuel, the flame spreads over the membrane more slowly or not at all, and if it does ultimately burn it produces less smoke, which is another vital safety factor. Housewrap has a fire rating of class B-s1, d0 according to EN 13501-1.

□ DuPont Tyvek
United Kingdom
☎ +44 (0)1275 337660
www.tyvek.co.uk

Development strategies for the future

As the industry gears up towards requirements for all new homes to be zero carbon from 2016, the Miller Homes Dukesmead development in Nottingham was designed to test proposed specifications for each regulatory stage along the way. Two plots were built to current requirements under the 2010 revisions to Approved Document Part L, two further plots to meet the Fabric Energy Efficiency Standard (FEES) and the final plot is designed to meet the expected Zero Carbon Hub Carbon Compliance standard.

All five dwellings feature Knauf Insulation's glass mineral wool products, with Supafil 34 blown-in insulation used for the external walls. Claimed to offer an unrivalled combination of thermal performance and on-site practicality, it has a thermal conductivity value of just 0.034 W/mK. Supafil Party Wall was also specified. Earthwool® Loft Roll has been installed between the timber joists: the company says this product is made with a formaldehyde-free binder based on rapidly renewable materials instead of petro-based chemicals, to enhance its environmental credentials without affecting thermal, acoustic or fire performance.

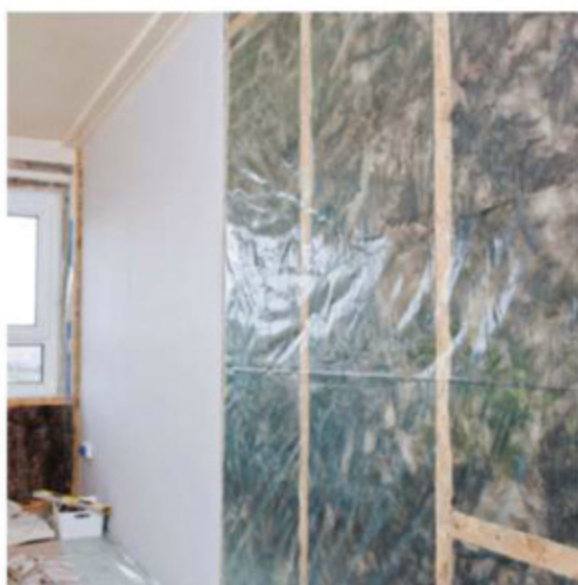
Darren O'Reilly, associate director of supply chain at Miller Homes, said: "The design

strategy takes a fabric first approach, with an emphasis on reducing the impact of thermal bridging and delivering an appropriate standard of air-tightness. Insulation, therefore, plays a vital role in this approach."

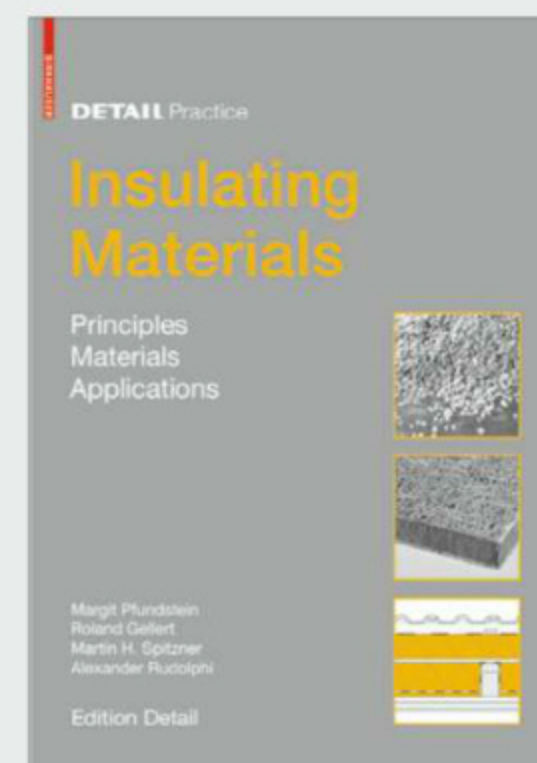
A project to refurbish six tower blocks in Glasgow and make significant savings on heating bills in an area heavily affected by fuel poverty also features Knauf insulation, in the form of ThermoShell® Internal Wall Insulation. The system incorporates Earthwool EcoBatts water-repellent, glass mineral wool slabs friction filled between EcoStuds to completely fill the available space. The thermally engineered insulated studs with their extruded polystyrene content eliminate the thermal bridging issue associated with timber and metal studs, and provide a high level of compressive strength.

The IWI insulation (below, centre) has been developed for whole-house, low-energy refurbishments as a straightforward and easy-to-use system, and is finished with a traditional plaster skim or dry lining.

□ Knauf Insulation
United Kingdom
☎ +44 (0)844 800 0135
www.knaufinsulation.co.uk



Edition DETAIL



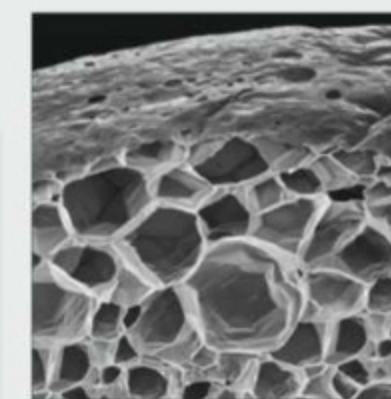
Insulating Materials

2008. Margit Pfundstein, Alexander Rudolphi, Martin H. Spitzner, Roland Gellert. 112 pages with numerous drawings and photos. 21 × 29.7 cm. Paperback. ISBN 978-3-7643-8654-2 € 42.95 / £ 35.- / US\$ 60.- + postage/packing + VAT, if applicable
DETAIL Practice series

Guide to the correct choice and use of insulating materials

Detail Practice "Insulating Materials" provides a comprehensive catalogue of insulating materials for use in building construction. Commentaries on the individual insulation products provide information on the raw material content, typical properties, areas of use and supply forms. Tables showing physical parameters and details of fire behaviour, as well as information on health and environmental compatibility, allow the various insulating materi-

als to be compared. A summary of European and German legal regulations and insulation material standards with product identification and certification assists planning and tender specifications. Construction criteria and areas of use are listed and enable the appropriate material to be selected. In addition, a differentiated examination of the ecological effects of insulating materials reveals the large potential for optimising their sustainable use.



Catalogue of insulating materials

Numerous tables with parameters and standards

Pictograms illustrating the application of the individual insulating materials

Areas of use and construction examples, preventing thermal bridges (steep and flat roofs, walls, floor, perimeter insulation)

Current data on the ecobalance of insulating materials

www.detail.de/p-insulating



EWI system helps hospital achieve excellence

West London's Finchley Memorial Hospital, which won Best Designed Project at the Partnerships Awards in 2013, has gained 'Excellent' status under BREEAM with help from Sto's external wall insulation system. The previous hospital on the site was much in need of refurbishment, and NHS Barnet decided that demolition was the best option, albeit the more expensive one, as this would enable them to move the building's location from a tucked-away corner of the site to the heart of nearby green space.

The new hospital has carbon efficiency measures at its core. "We chose StoTherm Classic K external wall insulation with the aim of significantly reducing energy loss by essentially wrapping the building in a thermally resistant jacket," Xav Roberts, project architect from Murphy Philipps, explained. "This means that internal space is not compromised and a comfortable temperature is maintained throughout the year."

The system was specified with 180 mm insulation, which has resulted in a U-value of 0.28 W/m²K, helping to achieve the A-rated BRE status. Sto-Rotofix Plus fixing method was chosen for use in conjunction with the render. Commented Xav Roberts, "The flexible system works with the angles of the

building, but also means there are no unsightly movement joints. The result is a very crisp exterior."

After completion of the new building and car park phase two of the project is now also nearing completion, with the previous building having been demolished and the landscaping beginning to become established. The new hospital is the equivalent in size to its predecessor but the internal space is used much more effectively, with one of the main changes being better bed provision.

Murphy Philipps worked closely with the NHS Shine Network, the learning network for sustainable healthcare buildings, to include public health responsibility when designing the campus. The hospital shares some of the external space with a local school and is now the centre of a health campus boasting two five-a-side pitches, a nature reserve, a memorial garden (where some of the stones from the previous building are placed) and a large open space at the front of the hospital for use by the general public.

□ Sto Ltd
United Kingdom
☎ +44 (0)141 892 8000
www.sto.co.uk



Concrete cost savings

A four-storey property with 17 apartments and three commercial units has been built in the heart of the Bonn-Beuel district of Germany using blocks from the Bisoplan range by Bisotherm. The whole project was geared towards energy efficiency, low operating costs and high sound insulation values, coupled with a healthy indoor climate, and the company says this series of blocks offers an optimal cost-benefit ratio, making it an attractive choice for multi-storey construction.

The homogeneous exterior masonry contributes to the fact that the primary energy demand of the building remains well within its calculated value and is claimed to surpass the legal requirement value by a significant margin. The exterior of the monolithic, lightweight concrete shell was created with 36.5 cm blocks.

The Bisoplan series allows for a single skin and caters for high thermal insulation requirements without additional insulation materials. (The continuous inner webs also allow for use in seismic zones without the need for additional design requirements to satisfy longitudinal compressive strength requirements in the length of the wall.)

The sound protection criteria even covered such areas as the wet room locations and bathrooms. Here 11.5 cm thick Bisotherm-Normaplan V12/2.00 was used throughout, reaching a sound insulation value of 48 dB. The company states it is one of the few suppliers of lightweight concrete masonry stones to also offer a thin-bed mortar specifically developed for precision block technology. The Bisotherm thin-bed mortar has a thermal conductivity of 0.24 W/m²K said to be four times more efficient than a standard thin-bed mortar.

□ Bisotherm GmbH
Germany
☎ +49 (0)26 30 9876-0
www.bisotherm.de



Balcony and terrace system is designed to overcome space restrictions

A stylish purpose-built development of three houses in Leeds, West Yorkshire features Optim-R Balcony & Terrace System from Kingspan Insulation. The properties each have two double bedrooms, a bathroom and a balcony. Vacuum Insulated Panel (VIP) insulation, installed by APP Construction, was the product of choice for architects West & Machell as it ensured an even transition between the indoor and outdoor levels on to the balcony without losing space from the bedrooms below, whilst attaining a U-value of 0.14 W/m²K. This was achieved using 40 mm of Optim-R overlaid with 25 mm of the company's Thermaroom TR27 LPC/FM.

Steve Sullivan, contracts manager for APP Construction, commented: "In this high-quality development it was critical that APP Construction maintained all U-values whilst not impacting on the living spaces. The solution proposed...allowed us to achieve optimum levels of thermal performance within a very limited floor void."

The VIP panel is evacuated, encased and sealed in a thin, gas-tight envelope and is designed to give outstanding thermal conductivity with the thinnest possible solution to insulation problems. A complementary product is the rigid infill panel, which can be cut to fit around problem areas such as drainage gutters.

Suitable for both new build and refurbishment projects, and with an aged design value thermal conductivity of 0.007 W/mK, the balcony and terrace system is said to provide a superior insulating performance and comes in thicknesses of 20 to 60 mm. The supporting design service ensures the panels are used as effectively as possible in the space available.

Kooltherm Cavity Closer, also from Kingspan Insulation, has been installed as part of a new £5 million primary school in Kidderminster. Features of the innovative, three-



winged design of St. Catherine's Primary School include top-class IT facilities, high-ceilinged classrooms to maximise natural light and group rooms which allow a different approach to teaching.

The cavity closer is manufactured in a range of 13 sizes from 50 to 150 mm, which meant that for this project it could be specified to tightly fit the 140 mm wall cavity in a single thickness. For especially large cavities, jointing clips can also be used to extend the range up to 300 mm.

The product was selected for the school project by Worcestershire County Council's architects department and installed by main contractor Kier Construction. Energy efficiency was a priority for the school and the product formed a key part of this solution, contributing to the insulation envelope with a thermal conductivity of 0.022 W/mK and preventing thermal bridging around the windows and doors.

By eliminating thermal bridging at these openings it also helped the building meet requirement B3 of the Building Regulations regarding internal fire spread – the cavity closers up to 150 mm have passed a one-hour UKAS accredited fire resistance test

with PVC windows and can help prevent fire and smoke from breaching the building's compartmentation through the wall cavity.

The PVC-U J-section acts as a positive damp-proof barrier and avoids the issues of condensation and mould growth within the cavity. The company says the product is suitable for use with timber, metal or PVC window frames and can also be factory formed to any specified radius for curved openings such as bullseye windows.

Kier Construction project manager Ali Long commented: "The project at St. Catherine's Primary School required a cavity wall insulation product that was going to fulfil the energy-efficient performance credentials specified by Worcestershire County Council. Kingspan provided a cost-effective solution which helps the building achieve improved energy performance, complementing other energy-efficient design features. Kier and Kingspan worked closely together to ensure a successful solution was delivered on time and to budget for the client."

□ Kingspan Insulation
United Kingdom
☎ +44 (0)1544 387384
www.kingspaninsulation.co.uk



Wall and Floor Tiles



Weitere Produkte zum Thema Böden unter:
www.detail.de

Cersaie 2013 – Simple floorcoverings become distinctive design elements

Over 100,000 visitors, more than half of them from overseas – once again Cersaie has reinforced its claim to being the world's largest and most important ceramic trade fair. From 23–27 September 2013, the focus of the ceramic world was on Bologna, where a definite trend could be discerned. Gone apparently are the days when tiles were simply used as low maintenance, practical wall- and floor-coverings. With bright colours, floral patterns, Moorish ornamentation and stylish retro looks, porcelain stoneware is creating a whole new visual presence.

In keeping with the new trend of 'away from the practical, towards the expressive', the focus of the supporting programme was on female-influenced architecture. Three architects known for their visionary power and willingness to transcend limits were invited to the fair: Brazilian architect and winner of the arcVision Women and Architecture prize, Carla Juaçaba; Spanish architect and professor, Izaskun Chinchilla; and the Minnesota-born architect and chair of the board of trustees of the Frank Lloyd School of Architecture, Sarah Robinson. All are united by their passion for design and construction, as well as by their desire to share their knowledge with others.

And all three architects agreed that "a lot remains to be done when it comes to opening up the world of architecture in its entirety to women".

A parquet fair or a tile fair? Walking through the halls of Cersaie, this is a question that visitors might well have asked themselves since 'wood tiles' seemed to be on display at every stand. With ceramic tiles available in a wide range of colours, surfaces and sizes, manufacturers are seeking to highlight the product advantages of ceramic compared to wood, with the Asian market in particular appearing enthusiastic.

The formats and designs available now go far beyond traditional plank floors, with Roca, for example, offering the Yellowstone collection, which has a three-dimensional mosaic appearance (below, left). The realised concrete and marble structures too can hardly be distinguished from the real thing, one example being Lea Ceramiche's Dreaming collection (below, centre). A new surface treatment now makes the marble range even more vivid and bright.

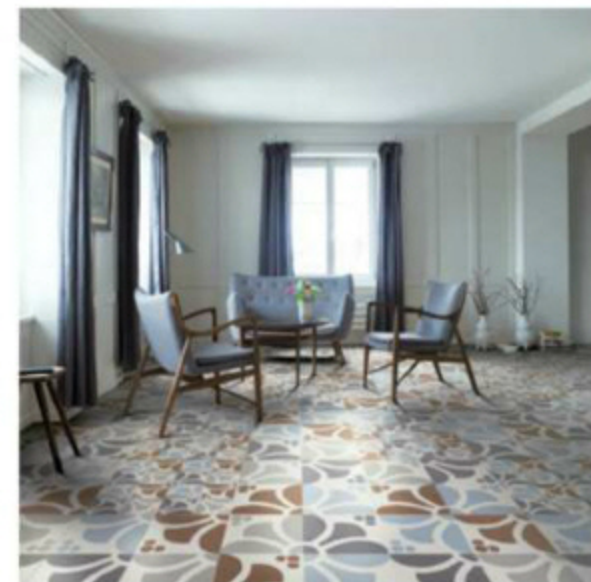
One clear-cut design trend not involving good or bad imitation is the widespread trend towards vibrant colours and intense

patterns, ranging from Moorish appearances, through floral designs, to stylish retro looks. For its new Frame-up collection, Refin turned to international style and interior design specialists as well as the FM Milano studio for inspiration. The series includes four new decors: two geometric circle patterns and two nostalgic designs with the sinuous patterns of Emilia majolica tiles of the late 18th century (below, right).

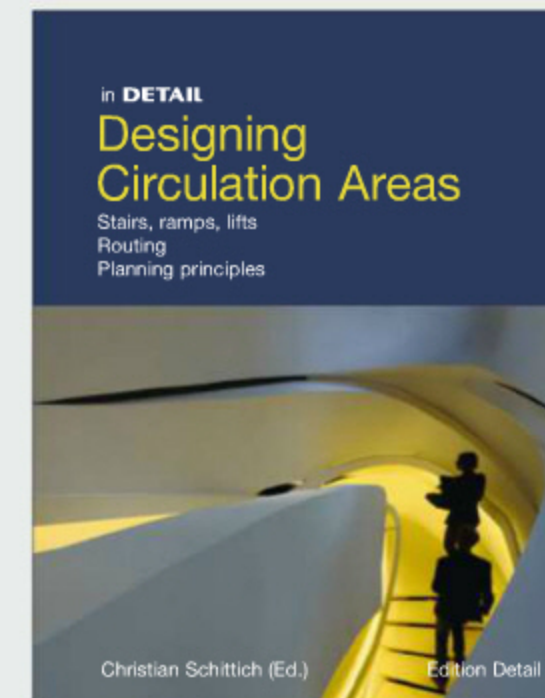
Bright, colourful, daring – Iris Ceramica calls its new Balance collection (above) "a multicoloured explosion" that mixes strong colours like Mint, Tangerine and Lemon with other shades such as Licorice, Plum, Steel, Linen, Desert and Mist. A definitive goodbye to boring floors and walls, therefore. And this is undoubtedly only the beginning: Cersaie 2014 looks set to be an even more exciting event.

Cersaie 2014 will take place in Bologna from 22–26 September 2014.

- www.cersaie.it
- www.rocatile.com
- www.ceramichelea.com
- www.refin-ceramic-tiles.com
- www.irisfmg.com



Edition DETAIL



Designing Circulation Areas

NEW June 2013. Christian Schittich (Ed.), 176 pages with numerous drawings and photos. Format 23 x 29.7 cm. Hardcover. € 96.90 / £ 56.– / US\$ 98.– ISBN 978-3-920034-89-8 + postage/packing + VAT, if applicable in DETAIL series

Pleasant and inviting Circulation Areas

A necessary evil or a fascinating design task? "Providing for circulation" is about making building components and spaces accessible in the horizontal and vertical direction while taking into account a wide variety of requirements. When architects make it into the pivotal element of their concepts, they often create compelling yet surprising room constellations: Spectacular lifts and escalators, unusual floor plan arrangements or stairway sculptures that define the space provide staging for the required pathways. Circulation areas take on the characteristics of an amenity and become an

exciting spatial experience as well as a crucial criterion of a successful design. The separation between circulation areas and space dissolves, because circulation areas become a space of sojourn and communication. Alongside extensive project documentations that provide a great deal of inspiration and stimulate new ideas, theoretical contributions of renowned specialist authors illuminate the topic in regard to planning basics, route guidance, steering of visitor flows, orientation in space, accessibility for the disabled and the important task of light planning.



Staged paths and exciting communication spaces

Innovative concepts for providing infrastructure

New space strategies

Spectacular lifts and escalators

Typological spectrum of project examples



Bright future for traditional range revamp

Forbo Flooring Systems' new Flotex range is set to challenge its often traditional perception with a striking Neon colour palette, along with other enhancements to the collection, which claims to provide the warmth and comfort of a textile with the performance of a resilient floorcovering. Metro Neon sees eight vivid and vibrant colours designed to work on their own or with the existing Metro collection to highlight areas – for example, breakout and work spaces, as well as 'walkways' through open spaces.

Metro itself includes six new shades: Jade, Red, Burgundy, Tangerine, Cinnamon and Truffle. Different aesthetic effects can be achieved depending on whether the tiles are installed in a broadloom or tessellated configuration. Combining the two options will add depth and texture to a space.

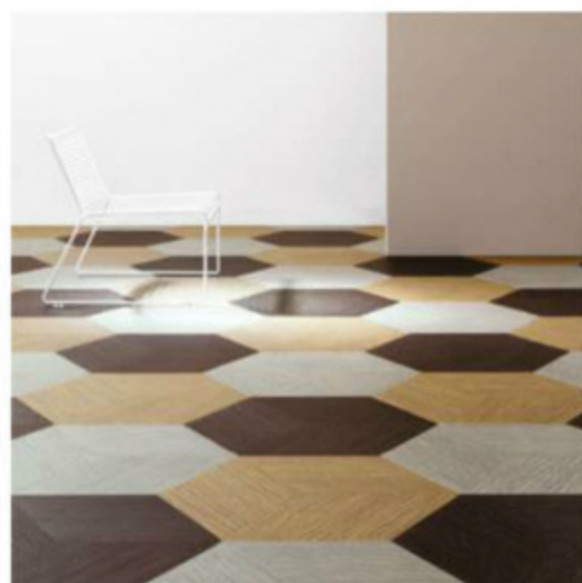
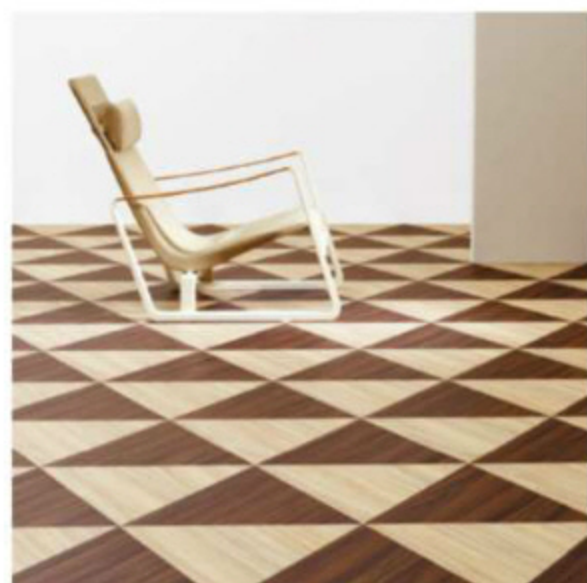
The Calgary colour palette has also been increased, from 24 to 30 options. A more subtle and calming range of colourways, it is said to be ideal for healthcare environments and enables designers to play with new shades such as Riviera and Spa, Salmon and Ginger as well as Linen and Amber for a balanced mix of neutral and bright selections. Flotex carries the Allergy UK Seal of Approval, is waterproof and rot proof, allow-

ing for cleaning right down to the base of the flock, and offers up to 20 dB sound impact reduction, so suiting education environments where keeping noise to a minimum is a priority.

Also from Forbo, new Allura Form is a luxury vinyl tile (LVT) range designed to reflect contemporary and emerging trends. This extends the core Allura concept with new shapes, bigger sizes and the popular mix and match modularity format, as well as an earthy neutral palette and novel patterns.

Highlights include Triangle, in two contrasting wood effects, and Square tile on which the oak design is cut diagonally, so the grain runs at 90° to create a parquet effect. These distinctive themes and shapes offer a new design concept to traditional LVT markets such as hospitality, leisure and retail. The modular concept is also present in the Stone design: available in three sizes up to a maximum of 1 x 1 m, Stone Dimensions is a neutral, natural stone-look tile for high-end retail outlets and modern offices.

□ Forbo Flooring Systems
United Kingdom
☎ +44 (0)800 093 5258
www.forbo-flooring.co.uk



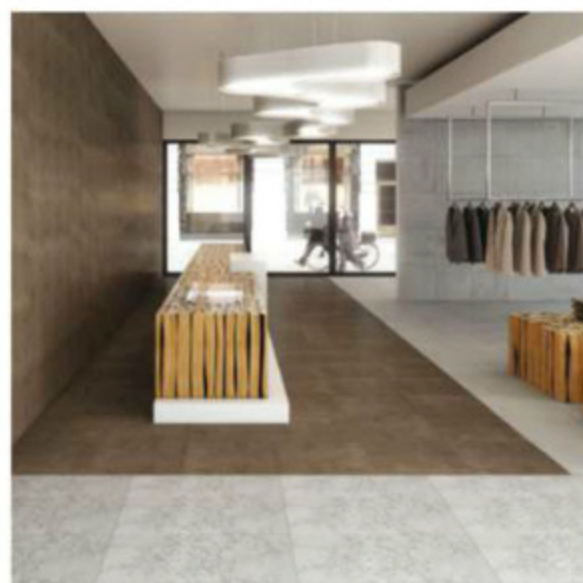
City influences

Urban Inspired, as the name suggests, took its starting point from major world cities and the materials influencing their appearance. Turkish tile manufacturer Vitra looked to Rio de Janeiro with its lively, colourful vibe, to Rome's classical grandeur and to the dramatic architecture of Moscow and Berlin. Completing the range are the two shown, named for Istanbul (above) and London.

Istanbul Inspired offers the grain and appeal of wood in a porcelain tile – black and white, light and dark, each with the choice of three patterns including a relief pattern and yellow decoration. They are intended to recall the Ottoman designs of the past, and a city that was home to many civilisations, conquered and built upon, layer on layer.

London is here defined as a city that reinvented itself with the dawn of the industrial age, and the tiles offer the lustre and sheen of poured concrete in a metal frame. Colours are white, grey and taupe, with a flower motif to 'bring a touch of refinement into the hard-wearing fabric of modernity'.

□ Vitra
United Kingdom
☎ +44 (0)1235 750990
www.vitra.co.uk



Grape or grain

The Soleras range from ABK owes its style to an original and aesthetically appealing material that would be impossible to use in reality, says the company. The collection seeks to reproduce the appeal of wooden staves from barrels used for ageing wines and spirits. While the curved natural wood could never be used on floors or walls, the porcelain tiles have the appearance of both the wood grain and the markings left when liquids have stood for a long time in barrels. For residential and light commercial use, they come in six colours and in a variety of plank sizes.

A second new collection is Downtown, described as an original surface that reflects the history of urban pedestrian areas, with a look reminiscent of stones, pebbles and well-trodden pavements. The five colours (shown below is Ivory) provide a sophisticated, contemporary palette. There are six modular sizes from 30 x 30 to 80 x 80 cm with natural or rectified edges, and in matt or honed finishes, and these are also suited to residential and light commercial use.

□ ABK Group
Italy
☎ +39 (0)535 761311
www.abk.it



Soft hues feature in cement tiles collection

Waterworks is a premier luxury bathroom and kitchen brand from America, which has founded its reputation on an absolute commitment to design authenticity, innovation and quality. The company says it has continually drawn inspiration from the rich history of the European bath, whilst bringing American ingenuity and technical innovation to each product created through a unique collaboration involving designers, craftsmen, artisans and manufacturers.

In addition to offering a wide selection of exclusive designs encompassing bathtubs, washstands, taps and fittings as well as home furnishings and accessories, Waterworks supplies an extensive range of contemporary bathroom and kitchen tiles.

Amongst them is the Promenade range of encaustic tiles, which have been produced in chalky modern hues. These tiles celebrate the centuries-old tradition of making cement tiles, combining natural materials and artisanal craftsmanship. The colours range from soft shades of grey and coral to stronger hues such as marina blue, aqua, ebony and rust.

The cement tiles are described as an eco-friendly product and derived from a combi-

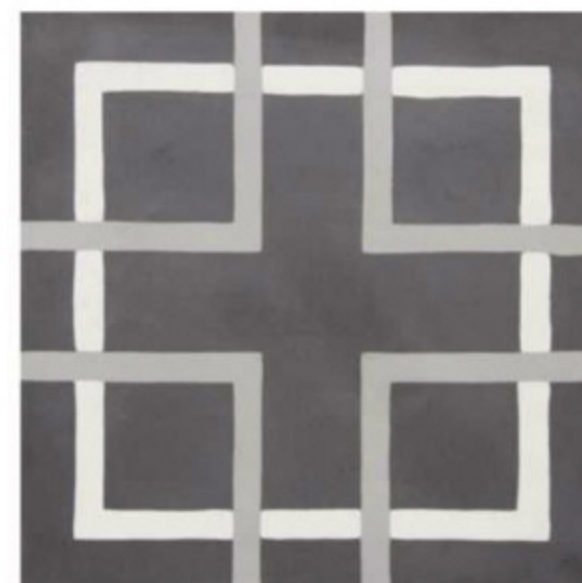


nation of natural elements. Shown here are Lattice (top), Lido (below, right) and Hopscotch (below, centre) from this collection of plain and decorative field tiles, which is suitable for both walls and floors and comes in a 20 x 20 cm size.

They are designed to offer a fresh, contemporary spin on a popular genre of tile and include 12 patterns that can be customised from the palette. The room set above shows a custom floor design from the Promenade range, marrying the contemporary and traditional aspects of the kitchen, which also features Grove Brickworks glazed wall tiles.

Other tile ranges include glass, stone and cement terrazzo tiles embedded with aggregates of natural stone or recycled glass. The company, which has showrooms across the USA and outlets in Canada and Europe, will be opening a showroom in London's King's Road in the spring of this year. The chief executive officer, Peter Sallick, is also the founder of the Dering Hall online design marketplace.

□ Waterworks
United Kingdom
☎ +44 (0)7974 430433
www.waterworks.com

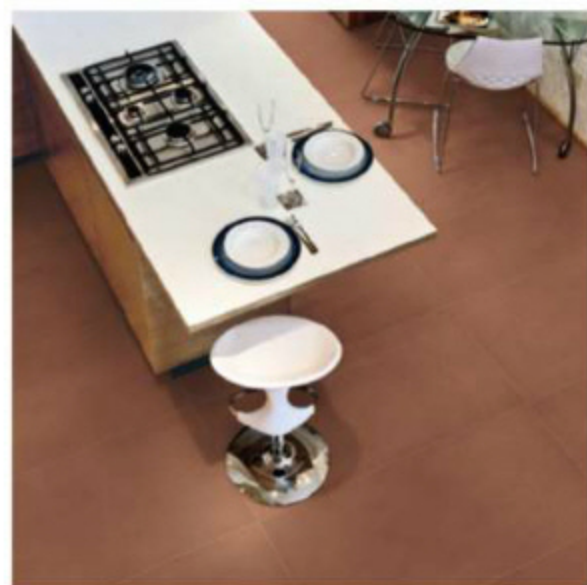




Bold colours and patterns

Many of the Spanish tile manufacturing companies which make up the Tile of Spain association are following the trend towards strong colours, florals, Victorian and Byzantine patterns, three-dimensional designs and natural impressions. The picture above shows the collection entitled Avenue from manufacturer Arcana Ceramica, which includes four shades and decorative tiles in the format 60 x 60 cm.

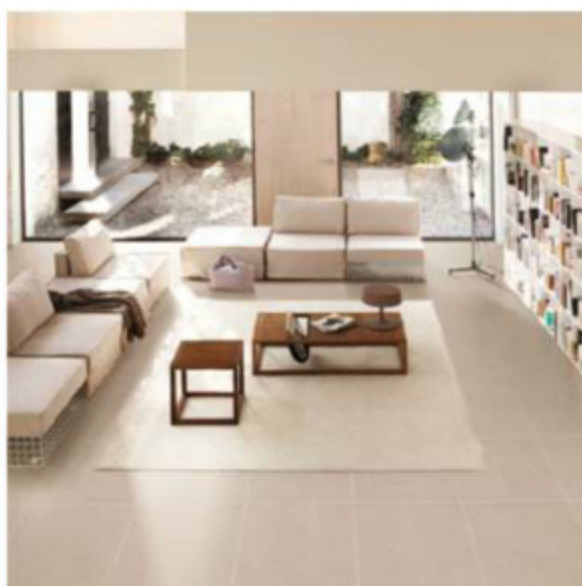
□ Tile of Spain
☎ +44 (0)20 7467 2385
www.spaintiles.info



Art and architecture

Architect Mauro Bellei developed the Tone collection for Eiffelgres as a merger between art and architecture, and for the latest series, Landstone, he was inspired by the warm colours of earth and nature. Thanks to the texture – bush-hammered and natural – and to the colour-shading the union comes to life in six chromatic shades (Paper, Ginger, Shore, Chili, Tobacco, Coal) that perfectly integrate with Greigetone tiles.

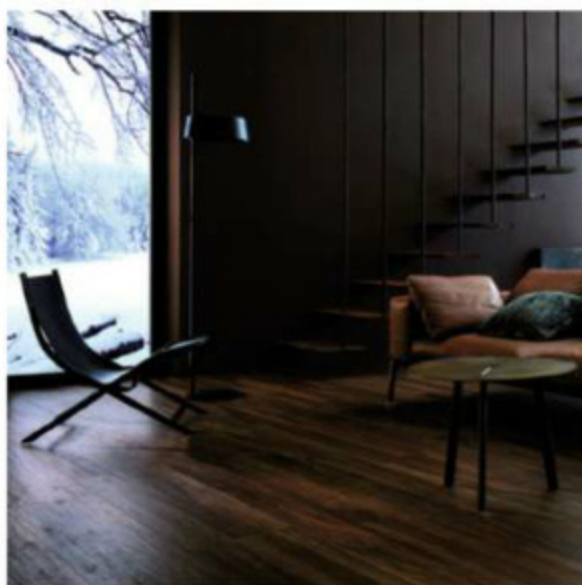
□ Eiffelgres
☎ +39 0536 862 111
www.eiffelgres.com



Living in harmony

Antonio Citterio and Patricia Viel designed their first collection in fine porcelain gres for Bisazza. Exuding an understated elegance and harmonious colours, the Acromi range borrows inspiration from the colours of nature and comes in eight shades, from silicon white to sand, dust grays to anthracite, and earthy browns to ultramarine blue. Complementing these is Origini available in black (Lava) and white (Ash).

□ Bisazza SpA
☎ +39 0444 707511
www.bisazza.com



Hand-crafted effect

The Treverkchic collection by Marazzi focuses on a hand-crafted, creative style, with natural inspiration from the source material. The fine porcelain stoneware is available in six colours – Noce italiano, Noce francese, Noce americano, Noce tinto, Teak Asia and Teak Africa – and four sizes, including a new 19 x 150 cm. It is intended for use on residential floors, such as living-rooms, kitchens and bathrooms.

□ Marazzi Group SpA
☎ +39 059 384111
www.marazzi.it



For indoors and out

The Stone Mix collection by Italgraniti is suitable for use in residential and commercial locations. The range is said to draw its inspiration from the natural world to deliver original perspectives on home design. Its variety of modules and technical qualities are the basis for sophisticated combinations and creative laying patterns: shapes and colours can be put together to design unique living spaces that match indoors and out.

□ Italgraniti Group SpA
☎ +39 059 888411
www.italgranitigroup.com



Sparkling marble

Used since ancient times as a material for architecture and sculpture, the special composition of marble enables light to penetrate and make it a 'sparkling stone'. GranitiFiandre showcases its New Marmi collection with five new types available in three formats and three finishes. The tiles are suitable on floors and walls for both interiors and exteriors, so a design can be carried through using the same material.

□ GranitiFiandre SpA
☎ +39 0536 819611
www.granitifiandre.com



Underground collection

The de_tiles range from Porcelaingres with its Just Grey and Just Beige collections is claimed to offer one of the most ample and complete ranges of tiles in terms of colours, surfaces and resistance. By adopting the colour scheme of its main collections, the company has now developed the Underground range of five terrazzo tiles that work perfectly as connecting elements between the colour shades of the de_tiles collection.

□ Porcelaingres GmbH
☎ +49 (0)35433 597123
www.porcelaingres.com



Close to nature

With the international megatrend to live an urban life in harmony with nature, says Villeroy & Boch, it has launched the Townhouse collection. The floor tiles are made of glazed vilbostone porcelain stoneware and available in the formats 60 x 60 cm and 45 x 90 cm. These tiles have a relief finish and provide R9 slip resistance. The colours Beige, Grey and Anthracite are produced as darker gradations of the wall tiles.

□ Villeroy & Boch AG
☎ +44 (0)20 8871 4028
www.villeroy-boch.co.uk

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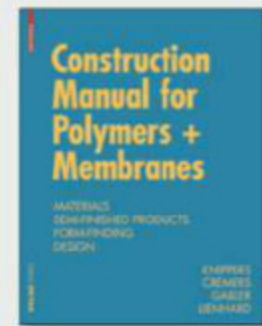
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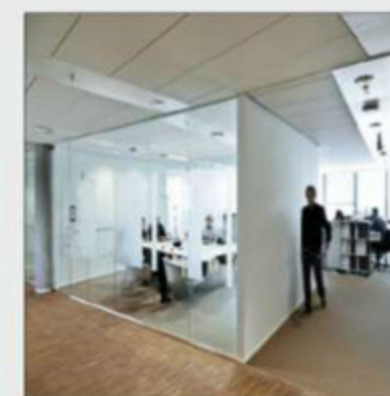
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page 18
Landscape for Living in Weißenbach

Weißenbach 117
A-2371 Weißenbach

- Client: Tobias Baldauf, Marie-Theres Okresek A-Weißenbach
- Architects: AL1 ArchitektInnen, Munich www.al1-architekten.de bauchplan, Munich www.bauchplan.net grundstein, A-Vienna www.grundstein.cc Peter Kneidinger, A-Vienna www.kneidingerpeter.net
- Project architects: Peter Kneidinger, Tobias Baldauf
- Team: Marie-Theres Okresek, Nicole Heiss, Irene Prieler, Michael Wildmann, Josef Rott
- Structural engineering: Peter Kneidinger, A-Vienna www.kneidingerpeter.net
- Loam construction, Composite timber and concrete elements: Peter Kneidinger, A-Vienna www.kneidingerpeter.net
- Polycarbonate facade panels: Senova Kunststoffe, A-Vienna www.senova.com
- Hemp insulation: Vinzenz Harrer GmbH, A-Frohnleiten www.harrer.at
- Rooftop greening: Halbartschlagier Sierning www.halbartschlagier.at
- Windows: Josko Fenster und Türen GmbH, A-Kopfling www.josko.at
- Joinery (Doors): Josef Dreisiebner, A-Straden with Martin Aigner, A-Vienna www.maa.at



page 21
Courtyard Design in London

Roehampton Lane
GB-SW15 5PU London

- Client: University of Roehampton, GB-London

www.roehampton.ac.uk

- Architects: Henley Halebrown Morrison, GB-London www.hhbr.co.uk
- Project architect: Noel Cash
- Structural engineering: Techniker, GB-London www.techniker.co.uk
- Construction management: Exel Construction Ltd., GB-London www.exelgroup.co.uk

- Mechanical services: Michael Popper Associates, GB-Twickenham www.michaelpopper.com
- Lighting consultant: CSG Lighting Design, GB-London www.csqlightingdesign.com
- Drainage consultant: CRM Rainwater Drainage, GB-Farnworth www.crmrainwater.co.uk
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- Precast elements: Mooncrete Precast Concrete Ltd., GB-Lingham www.mooncrete.co.uk
- External timber gates: Pine Martin Gates, GB-Melton Constable www.pinemartingates.net



page 24
Performing Arts Centre in Karlsruhe

Am Schloss Gottesau 7
D-76131 Karlsruhe

- Client: Land Baden-Württemberg vertreten durch Vermögen und Bau, Amt Karlsruhe, D-Karlsruhe
- Architects: Architekten.3P, D-Stuttgart Gerhard Feuerstein, Arne Rüdenauer www.architekten3p.de
- Project management: Christina Maier, Mentor Halili
- Assistants: Miriam Baehrens, Felix Wilhelm, Eugenio Bisignani
- Structural engineering: Pfefferkorn & Partner, D-Stuttgart www.pfefferkorn-ingenieure.de
- Building services: Pfeil & Koch Ingenieurgesellschaft, D-Stuttgart www.pk-i.de
- Electrical planning: Raible + Partner GmbH & Co.KG, D-Reutlingen www.raible.de
- Landscape architects: Elke Ukas Landschaftsarchitekten BDLA, D-Karlsruhe

www.ukas.de

- Construction management: Uli Wiesler, D-Stuttgart www.wiesler-architekten.de
- Building shell: Leonhard Weiss GmbH & Co. KG Ingenieurbau Göppingen, D-Göppingen www.leonhard-weiss.de
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Renovation and Extension of Community Centre in Männedorf

Alte Landstr. 250
CH-8708 Männedorf

- Client: Gemeinde Männedorf, CH-Männedorf
- Architects: SAM Architekten und Partner AG, CH-Zürich www.samarch.ch
- Projekt team: Sacha Menz, René Antonioli, Christoph Schneider, Kirsten Bohnert, Kristina Keutgen, Karin Läderach, Rahime Osmani
- Structural engineering: Walt+Galmarini, CH-Zürich
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- Electrical engineer: Theo Meyer, CH-Stäfa www.elling-meyer.ch
- System engineering: Huwyler+Koch, CH-Zürich www.huwylerkoch.ch
- Building physics and acoustics: Bakus Bauphysik & Akustik GmbH, CH-Zürich www.bakus.ch
- Sustainability: Lenum AG, FL-Vaduz www.lenum.com

Contractors and suppliers

Details of contractors and suppliers are based on information provided by the respective architects.



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Residence in Melbourne

Edward Street
AUS-3056 Melbourne

- Client: Confidential
- Architects, Lighting design: Sean Godsell Architects, AUS-Melbourne www.seangodsell.com
- Project architects: Sean Godsell
- Assistant: Hayley Franklin
- Structural engineering: Perrett Simpson Pty Ltd, AUS-Melbourne www.perrettsimpson.com.au
- Interior designer: Sean Godsell Architects, AUS-Melbourne www.seangodsell.com
- Landscaping: Sean Godsell Architects, AUS-Melbourne www.seangodsell.com with Damon Fuhrer, AUS-Melbourne +61 408 122643
- Building surveyor: Wilsmore Nelson Group, AUS-Glen Waverly www.wilsmorenelsongroup.com.au
- Quantity surveyor: Plan Cost Australia, AUS-Research www.plancost.com.au



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Soccer Stadium in Torrelavega

Boulevard Ronda
E-39300 Torrelavega

- Client: Sociedad Regional de Cultura y Deporte del Gobierno de Cantabria, E-Santander www.srculturaydeporte.es
- Architects, Lighting design: MMIT Arquitectos, E-Maliaño Agustín Montes Gaisan, Alberto Montes Gaisan www.mmitarquitectos.com

- Project architects: Javier Teran Alonso, Agustín Montes Gaisan, Alberto Montes Gaisan
- Assistants: Marco Antonio Medrano Navarro Gorka Blas Revilla
- Structural engineering: Estudio Dynamis E-Santander www.estudiodynamis.com
- Main contractor: Sacyr S.A.U., E-Madrid www.gruposyv.com
- Construction management: Javier Teran Alonso
- Concrete structure: Norton PH, E-Bizkaia www.nortenph.com
- Metal construction: Tauxme, E-Nancles de la Oca www.tauxme.es
- Sports accessories: Mondo S.p.A., I-Alba www.mondoworldwide.com



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Refurbishment and Redesign St. Moritz Parish Church in Augsburg

Moritzplatz 5
D-86150 Augsburg

- Client: Kath. Pfarrkirchenstiftung St. Moritz, D-Augsburg
- Architects: John Pawson Ltd., GB-London www.johnpawson.com
- Project architect: Jan Hobel
- Assistants: Stefan Dold, Reginald Verspreewen, Christine Bickel, Sanam Salek
- Construction management: Rainer Heuberger Architekten, D-Augsburg Tel.: +49 821 6502550
- Structural engineering: Dr. Schütz Ingenieure, D-Kempten info@drschuetz-ingenieure.de
- Building services: Ingenieurbüro Ulherr, D-Augsburg joachim.ulherr@ib-ulherr.de
- Lighting design: Mindseye, GB-London admir@mindseye3d.com
- Acoustics: Müller BBM, D-Munich harald.frisch@muellerbbm.de
- Electrical planning: Elektro Seitz GmbH, D-Augsburg gatteringer@elektro-seitz.de
- Stonemason: Steinmetz Kramer, D-Augsburg www.steinmetz-kramer.de
- Restoration (stone):

www.steinmetz-freyer.de

- Lighting: Sonepar, D-Düsseldorf www.sonepar.de
- Joinery: Kunstschrainer Max Braun, D-Lappersdorf www.max-braun.de
- Church windows: Derix Glasstudios, D-Taunusstein www.derix.com
- Organ building: Orgelbau Kuhn AG, CH-Männedorf www.orgelbau.ch
- Stucco work, plaster work: Jakob Schnitzer & Sohn, D-Augsburg www.schnitzer-stuck.de
- Painter: Alfred Binapfl Restaurierungswerkstätte, D-Friedberg Tel.: +49 821 61286
- Metal artwork: Christop Bechteler, Ulo Florack, D-Augsburg www.kunst.bechteler.com
- Heating: Heizung-Schmid GmbH, D-Neusäß www.heizungsfirma-schmid.de



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MUCEM in Marseille - Diaphanous and Structural Applications of UHPC

1 Esplanade du J4
F-13002 Marseille

- Client: Kultusministerium der Republik Frankreich, F-Paris
- Executive Client: Oppic, F-Paris
- Architects: Rudy Ricciotti, F-Bandol www.rudyricciotti.com
- Executive planning UHPC: Lamoureux & Ricciotti Ingénierie www.lamoureux-ricciotti.com
- Structural engineering: Sica Sa, F-Marseille www.sica-marseille.com
- Mechanical engineering: Garcia Ingénierie, F-Marseille www.g2i.fr
- Project managements Quantity surveyors: Cec Salinesi, E-Barcelona
- Acoustics: Thermibel, BE-Strépy-Bracquegnies www.thermibel.be
- Environmental engineer: Adret, F-Marseille www.adret.net
- Facade panels, shaping: L'Observatoire, USA-New York www.jobsintl.com
- Groundwork: SPIE Fondations, F-Vitrolles www.spiefondations.com
- Building shell prestressed concrete UHPC Facade UHPC: Dumez-Freyssinet Groupe, F-Gémenos www.freyssinet.com
- Joinery: Bareau S.A., F-Roquefort La Bédoule www.menuiseriebareau.com
- Floor coating painter: Sarl Jollisol, F-Marseille +33 491 150190
- Mechanical engineering, Seawater heat pump: Viriot+Hautbout, F-Aubagne +33 442 700543
- with Energie Sanitaire, F-Marseille es@esanit.fr



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An Acrylic-glass Curtain Secured with Adhesives - Vitra's SANAA Factory

Charles-Eames-Str. 2
D-79576 Weil am Rhein

- Client: Vitra Verwaltungen GmbH, D-Weil am Rhein www.vitra.com
- Architects: Kazuyo Sejima + Ryue Nishizawa SANAA, JP-Tokyo www.sanaa.co.jp
- Local partner architects: nkbak Nicole Kerstin Berganski, Andreas Krawczyk, D-Frankfurt www.nkbak.de
- Executive architects: Mayer Bährle freie Architekten BDA, D-Lörrach www.mayer-baehrle.de
- Facade engineering: Imagine structure GmbH, D-Frankfurt www.imagine-structure.com
- Testing laboratory: gbd Lab GmbH, A-Dornbirn www.gbd.at
- Structural engineering: Bollinger und Grohmann GmbH, D-Frankfurt www.bollinger-grohmann.com
- SAPS - Sasaki and Partners, JP-Tokyo
- Energy concept: Transsolar Energietechnik GmbH, D-Stuttgart www.transsolar.com
- Construction and execution of the facade: STRABAG AG, A-Vienna www.strabag.at
- Facade panels, shaping: K-tec GmbH, A-Radstadt www.ktec.at
- Acrylic glass: Evonik Industries AG, D-Essen www.evonik.de

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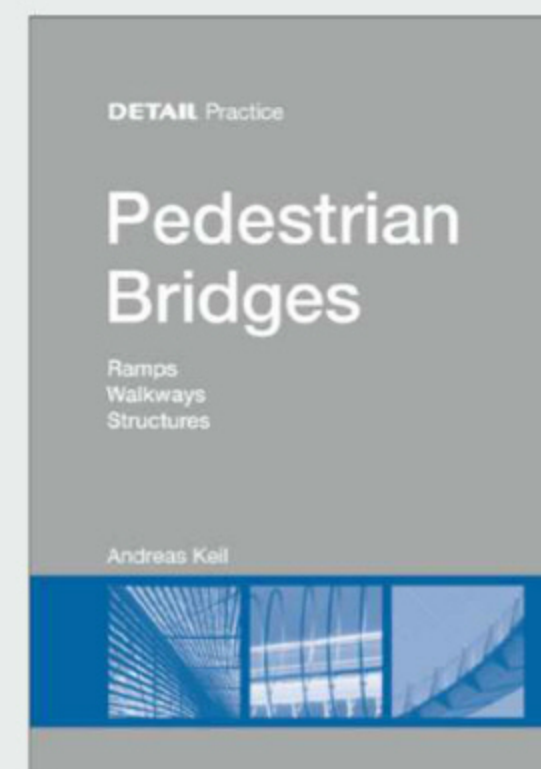
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