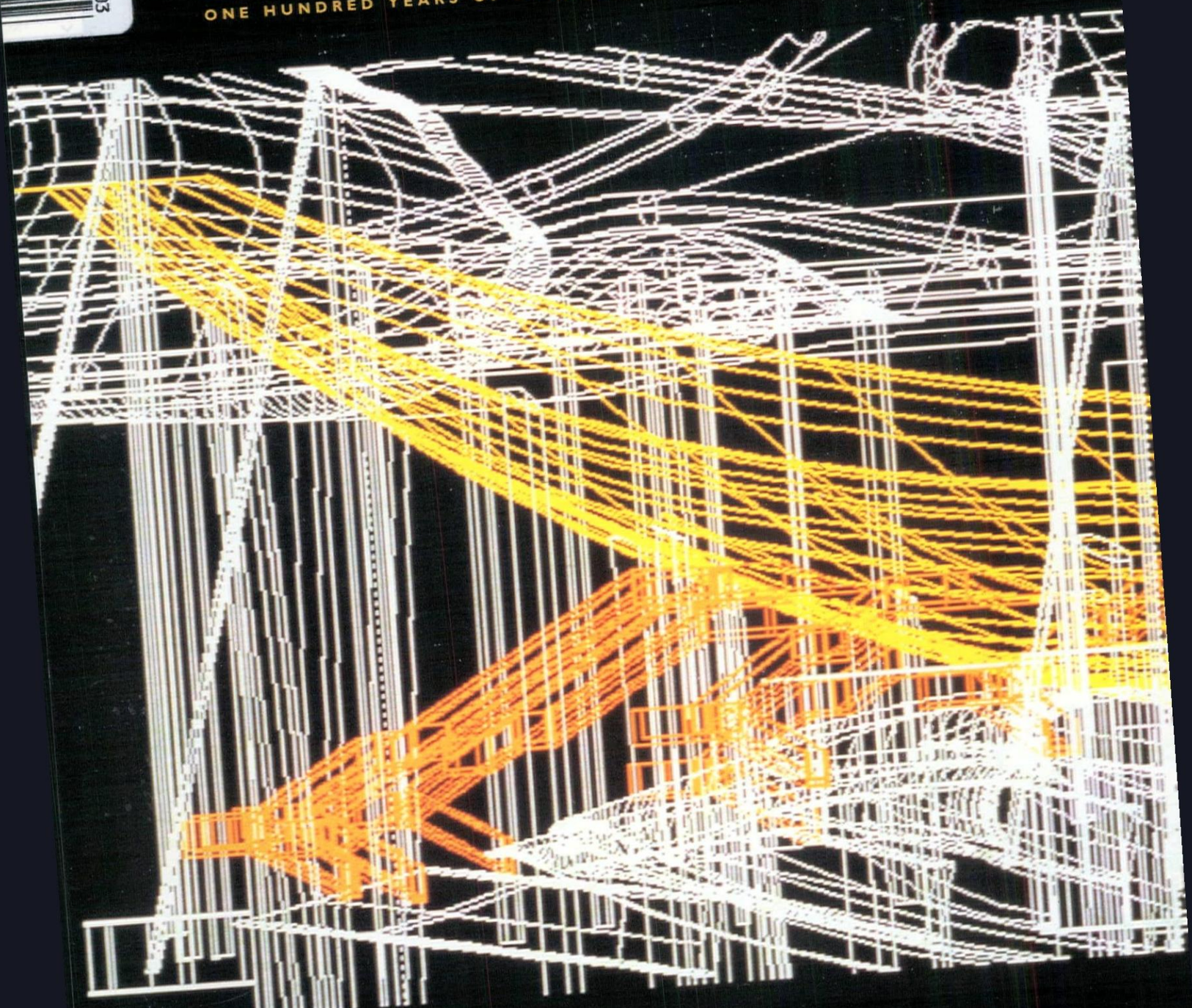
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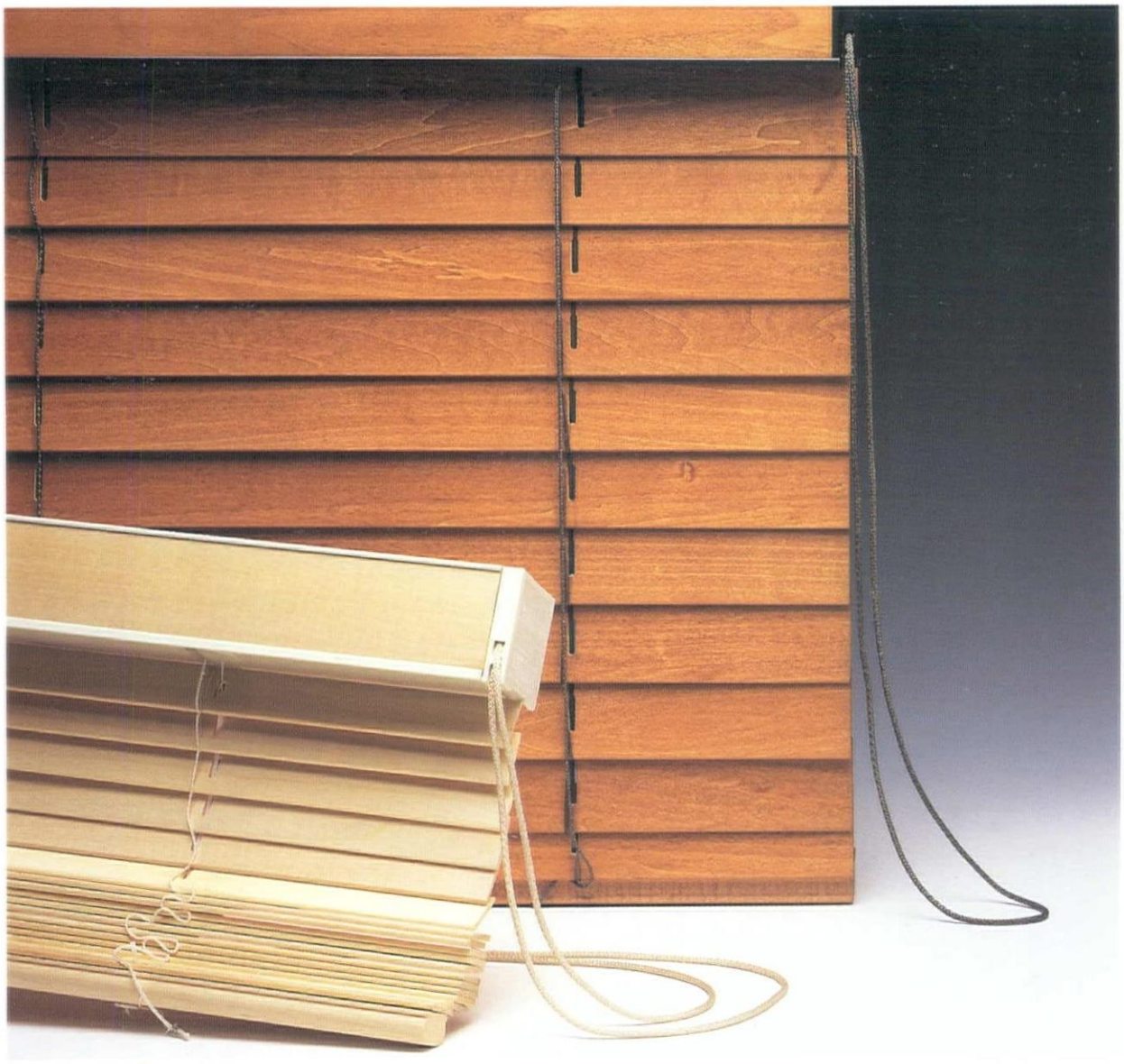
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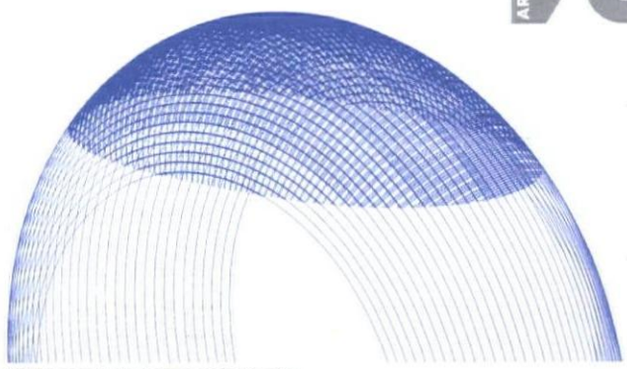
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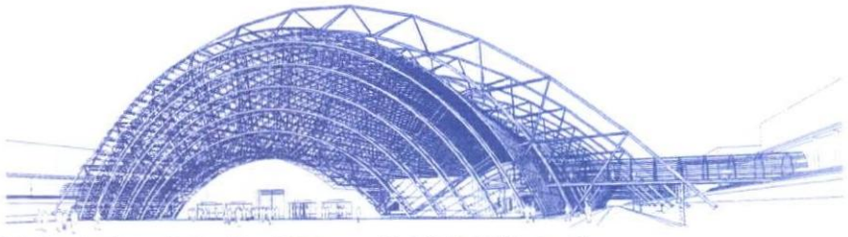
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Leipzig arches by von Gerkan, Marg & Partners and Ian Ritchie Architects, p74

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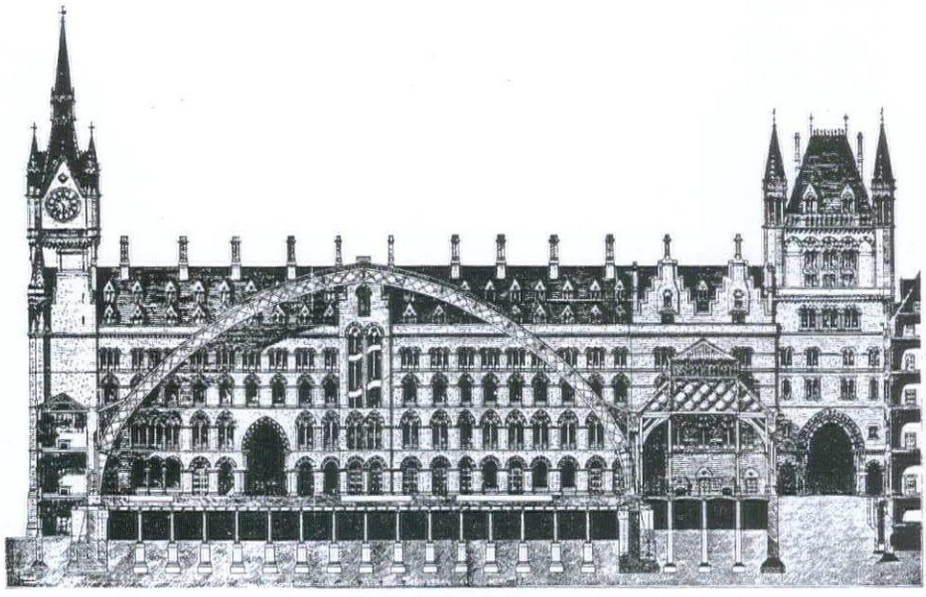
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COVER
Drawing for Chemnitz sports arena proposal by Peter Kulka with Ulrich Königs (pp78-79)

The most challenging creative problem that faces architecture today is the reconciliation of the wonderful potential of the new technologies with humanity's age-old perceptions.



Unreconciled: Barlow's great train shed practically ignores Scott's hotel elevation at St Pancras

CULTURE SPAN

In the last couple of centuries, architecture has had a relationship of love and hate to engineering and technology in general. Ruskin, for instance, was convinced when he wrote 'The Lamp of Truth' in *The Seven Lamps of Architecture* that 'the time is probably near when a new system of architectural laws will be developed, adapted entirely to metallic construction'.[1] But, almost in the same breath, he asserted that 'true architecture does not admit iron as a constructive material, and that ... the iron roofs and pillars of our railway stations, and some of our churches, are not architecture at all'.[2] His reasons were that the materials 'accessible in quantity ... clay, wood or stone' have determined the proportions and laws of structure of architecture from the earliest times so that the 'employment of metallic framework would ... be generally felt as a departure from the first principles of the art'.[3] Construction in metal (and glass, which, curiously, few people of the period talked about much, though developments in glass production were just as dramatic as those in the ferrous metals) was, thought Ruskin, so radically different from that of traditional materials that the world was not ready for it – and perhaps never would be.

The confusion that his thinking bequeathed is nowhere better seen than at St Pancras Station in London, where George Gilbert Scott created a Neo-Gothic front, much based on Ruskin's Gothic doctrine. Even Pevsner could not refrain from liking it :'No London hotel', he said, 'was quite so splendid and varied in appearance'.[4] Yet at the back is W.H. Barlow's glass and iron train shed, 1875 (one of the wonders of Victorian engineering, and the widest – 73 m – iron span ever made). The two come together in one of the most excruciating architectural cacophonies contrived in history, and no more perfect instance can be found of the culture clash of the nineteenth century.

In the very year in which the first edition of Ruskin's *Seven Lamps* was published, M. Jobard argued in the *Revue générale de l'Architecture* that 'The new architecture is architecture in iron. Architectural revolutions always follow social revolutions'. (He was writing just after the dramas of 1848.) 'There are great periods in architecture just as there are great historical periods: a new race of plants or animals only appears after the disappearance of the old. In architecture it is the same ... where shall we find masters clever enough? We should not tell you to seek these people among old masons whose hands have been so long occupied with stone and mortar that it is safe to presume that their brains also move in an equally restricted orbit. To create what is new, you must have young people.'[5]

Sigfried Giedion, in whose epoch-making 1941 book *Space, Time and Architecture* Jobard's words are to be found, wanted to generate a creative climate for the twentieth century as different as possible from the one that Ruskin had made in the nineteenth. Of Giedion's many passages on the wonders of new construction, his description of the steel Galerie des Machines by Contamin and Dutert for the Paris Exhibition of 1889 is one of the most lyrical: 'The dimensions ... exceeded anything previously known. The largest vaulting attempted up to that time had been St Pancras Station ... The glass end walls do not, strictly, close up the building; they constitute only a thin transparent membrane beween the interior and outer space ... The aesthetic meaning of this hall is contained in the union and interpenetration of the building and outer space, out of which there grows a completely new limitlessness and movement in keeping with the machines it contains'.[6] Giedion was out to provide the examples that would make the fusion of architecture and engineering seem established and exciting for the second half of the twentieth century.

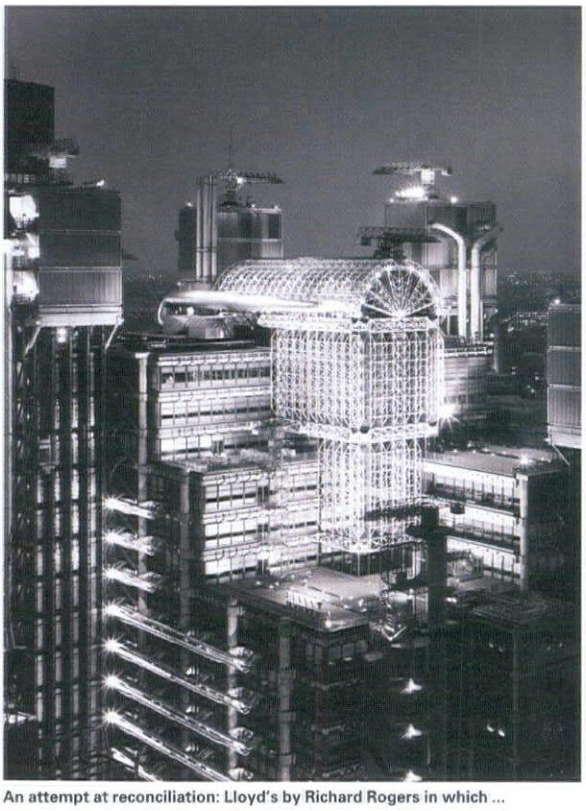
His message, that of the high Modern Movement, was received as gospel by architects for several generations after the Second World War. (Results were often less than successful: funds were short, new materials and building methods too little understood.) In the 1970s, the Modern Movement approach was given an immense boost and vastly increased range of expression by the evolution of new approaches to structural engineering, partly based on new inter-relationships of theories of statics, dynamics and pure



Unreconciled: 'real architecture', outside...



... and in. Quinlan Terry's Richmond Riverside



An attempt at reconciliation: Lloyd's by Richard Rogers in which ...



... contemporary technology embraces traditional custom

mathematics, and partly on development of new materials like very strong adhesives, silicone jointing for glass sheets and ductile iron.[7] At last the fusion of interior and exterior could be achieved in ways that were only dimly perceivable to nineteenth-century designers.

A whole new approach to society and the natural environment, hinted at by Giedion, began to be realisable. Richard Rogers is one of its most articulate protagonists: 'The creation of an architecture which incorporates the new technologies entails breaking away from the platonic idea of a static world, expressed by the perfect finite object to which nothing can be added or taken away, a concept which has dominated architecture since its beginning. Instead of Schelling's description of architecture as frozen music, we are looking for an architecture more like some modern music, jazz or poetry, where improvisation plays a part, an indeterminate architecture containing both permanence and transformation'.[8]

At its best, the approach involves the creative interaction of many previously semi-independent disciplines, for instance structural and services engineering, materials and ecological science to make architectures that offer a much wider variety of experience and human freedom than has ever been available before – and a flexibility of building that can cope with all the changes that contemporary society and technology create. At worst, the approach has rightly been attacked as technological fetishism, a weird (if highly enjoyable to some) worship of gutsy pipework and muscular trusses.

There has naturally been a reaction against the wilder and more trivial aspects of High-Tech (and against post-war over-reliance on technology). The response seeks to relocate the origins of architectural inspiration in our immemorial understanding of the phenomenal world. At best (for instance in the work of Leiviskä and Murcutt) this has been a useful and inspiring corrective to built forms of techno-babble. At worst, it has ended up with the neo-Right worship of Order and Tradition, which taken to absurd extremes produces what its advocates call 'Real Architecture'. Perhaps the most celebrated example of this tendency is Quinlan Terry's Riverside development in Richmond, near London where a modern office complex has been dressed up as a kind of eighteenth-century village set, using (admittedly) well built solid brick walls to surround some of the most dreary and Gradgrindian office floors ever built.[9]

Against this kind of cultural rubbish, we have to come down on the side of what people like Pevsner and Giedion called 'progress' – the belief that by properly using technology, by understanding the wonderful opportunities that contemporary engineering offers, we can start to make the world a marvellously better place to live in for everyone. But in so doing, we should not forget that Ruskin had more than a debating point: the phenomenal essence of architecture is still in many ways very ancient and only expressible in the roughness of brick, the smell of wood, the smoothness of polished concrete, the view of the skyline from a window, the comfort of enclosure. The reconciliation of our understanding of those things with the technological imperatives and opportunities that Rogers describes so well is the most challenging creative problem that faces the art and science of architecture today. P.D.

1 Ruskin, John *The Seven Lamps of Architecture*, George Allen, Orpington, 1886, p39. In this, the fifth edition, Ruskin uses the text that he first published in the first in 1849, but makes a footnote in which he refers to 'the ferruginous temper [of that time] which I saw rapidly developing itself, and which, since that day, has changed our merry England into the Man in the Iron Mask'.
2 *Ibid*, p40.
3 *Ibid*, p39.
4 Pevsner, Nikolaus, *London (except the Cities of London and Westminster)*, Penguin, Harmondsworth, 1974, p396.
5 Jobard, in the *Revue générale de l'Architecture*, 1849, quoted and translated in Giedion, Sigfried, *Space, Time and Architecture, The Growth of a New Tradition*, Harvard, third edition 1959, pp212-13.
6 *Ibid*, pp268-69. The book was based on lectures given at Harvard in 1938-39. (The Galerie des Machines was demolished in 1910).
7 The engineering approach that began to emerge from work on Jørn Utzon's Sydney Opera House was extremely important in this respect. Ted Happold and Peter Rice both worked on the building for Ove Arup & Partners.
8 Rogers, Richard, *Architecture, a Modern View*, Thames & Hudson, London, 1990, p46.
9 See Blundell Jones, Peter, AR October 1988, pp86-90.
Photographs
Top left, bottom left, Charlotte Wood; middle, Alan Delaney; right, Martin Charles





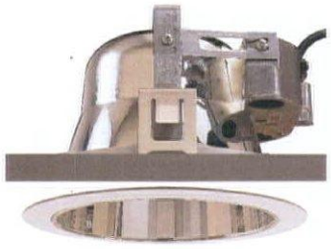
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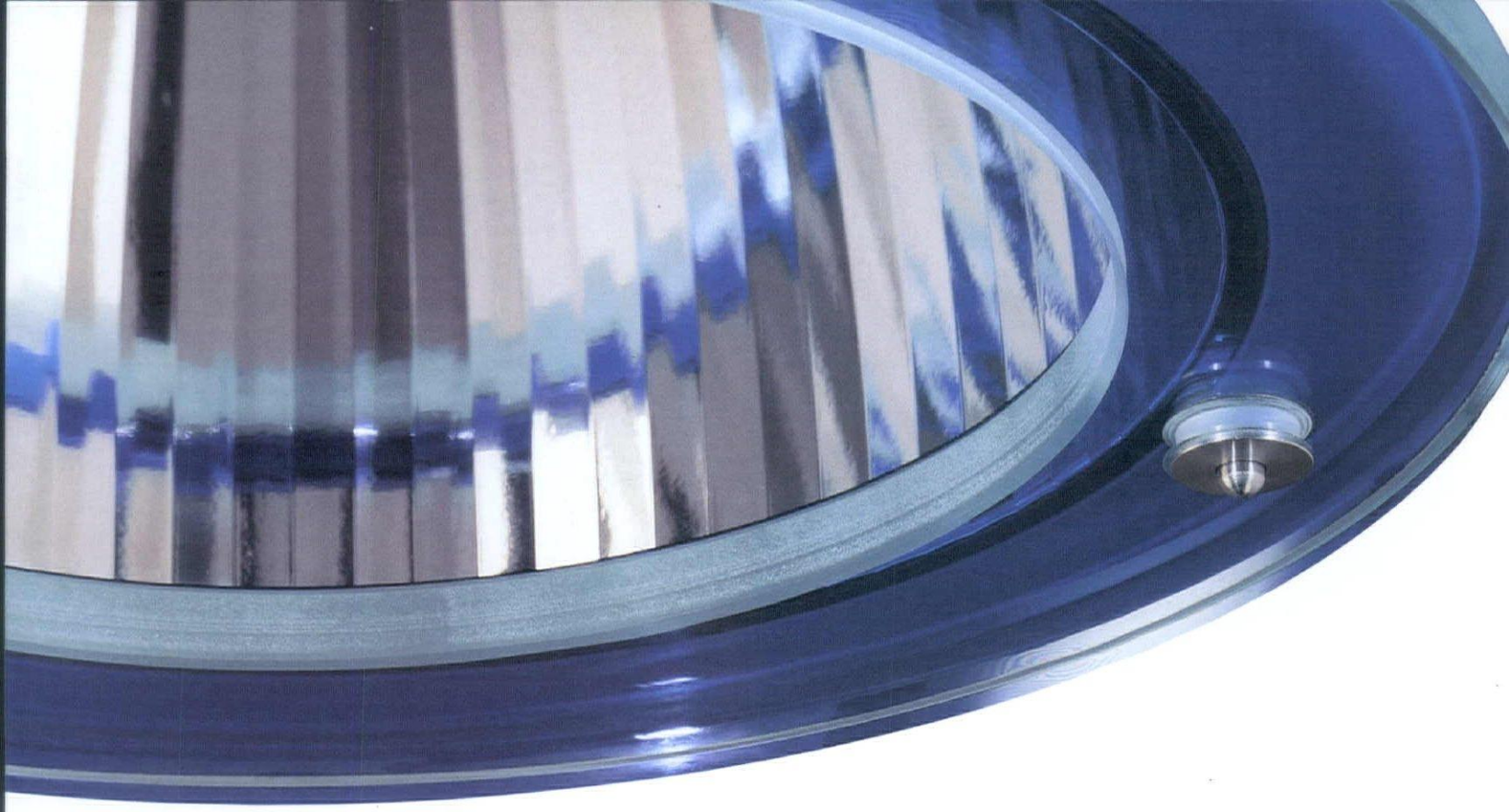
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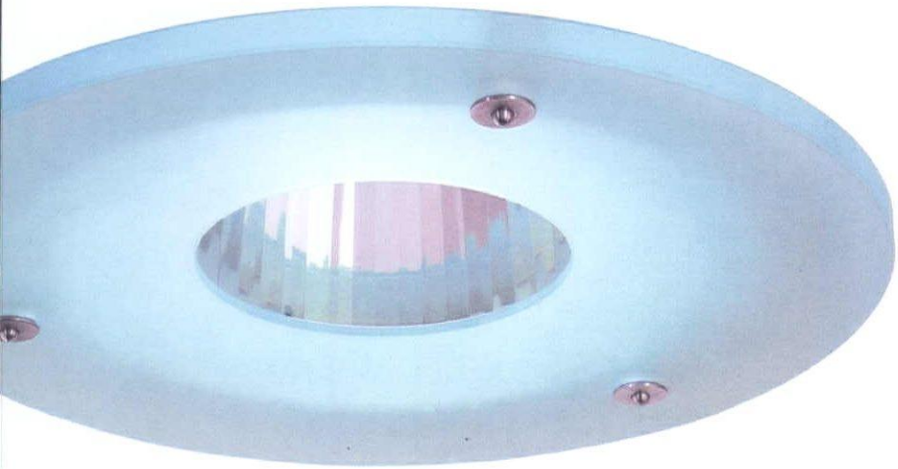




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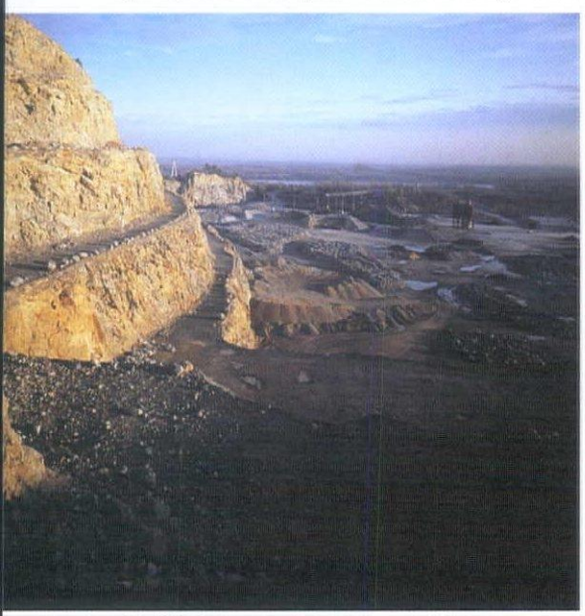
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Pfaffenberg in Vienna

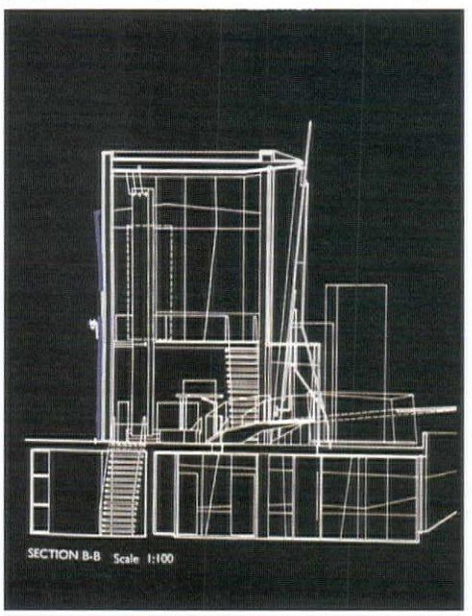
Hic Saxa Loquuntur and Mechanical Landscapes (The Pfaffenberg Projects) are parallel exhibitions on show at the Architektur Zentrum, Vienna from 13 January to 5 March 1996. Both exhibitions relate to the Pfaffenberg, a mountain rising above the small town of Bad Deutsch-Altenburg which is on the Danube, 40 kilometres east of Vienna and close to the border with Slovakia and Hungary. Limestone has been quarried for generations in the Pfaffenberg, the white face of the quarry is visible from five kilometres away. The Pfaffenberg is also close to the site of the former Roman town Carnuntum and Roman remains and relics are scattered throughout the area. The Hollitzer building materials company which owns and operates the quarry decided to sponsor an ideas competition to pave the way for the creation of a Pfaffenberg Museum, not as a single building but distributed over four different sites and consisting of an extension to the existing Museum Carnintinum, a pavilion for the Pfaffenberg geological museum, an open air theatre and a Belvedere. Contributions were invited from a number of international architects: Peter Cook/Christine Hawley, Zaha Hadid/Patrick Schumacher and Ian Ritchie all from London, Odile Decq, Benoit Cornette, Paris, Massimiliano Fuksas, Rome, Hans Kollhoff, Berlin, Elsa Prochazka and Hans Puchhammer, Vienna. First prize was awarded to Peter Cook and Christine Hawley for their 'Insertions' a series of small structures in the form of rectilinear steel masks which create a network of lay-lines to be traced at night by lasers.

It was Christine Hawley's involvement in this project which gave her the idea of using the quarry as the basis for a programme for Unit 21 of the Bartlett School of Architecture which she runs with C. J. Lim. The students first built a working machine which formed a catalyst for their proposed building in the quarry. Both exhibitions were first shown in the Aedes gallery in Berlin. They will travel to London, New York, Los Angeles, Paris, Venice and St Pölten before coming to Bad Deutsch-Altenburg.

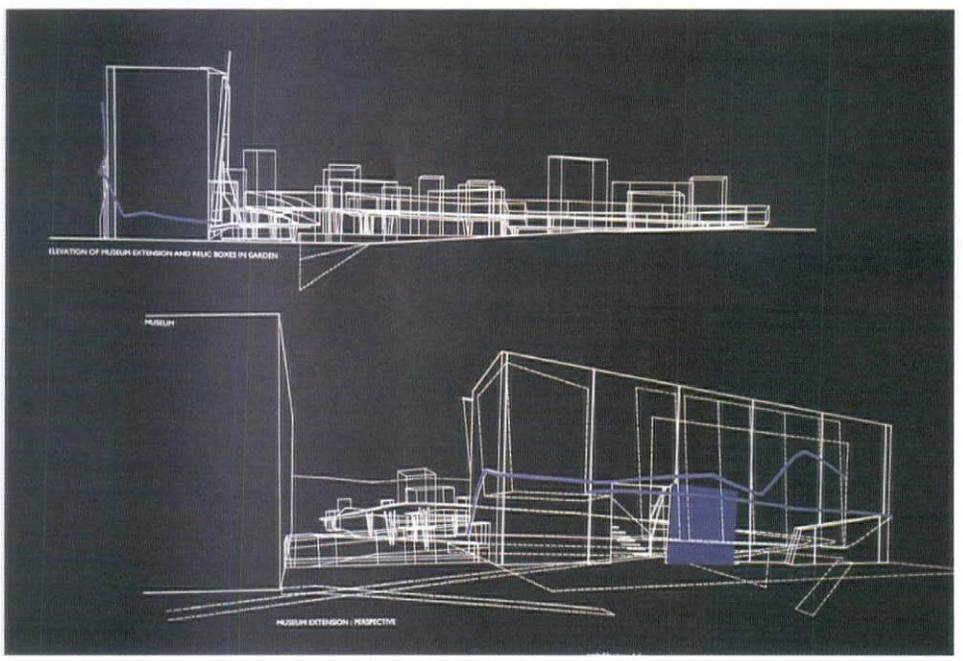
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The Pfaffenberg site (photo Margerita Spiluttini)



Peter Cook and Christine Hawley's 'Insertions' ...



... into the complex topography of Pfaffenberg: a series of small structures in the form of rectilinear steel masks

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Enquiries should be sent to Finland Wood Innovation Project, Tiina Voutilainen, Fabianinkatu 9, 00130 Helsinki; fax.+358-0-132 4599; e-mail t.vouti@wood.inet.fi. Closing date 31 July 1996.

VR Une Architecture extended

The closing date for the student competition for creative architectural interpretation using computer-aided architectural design (AR January p12, and AR February p13) has been postponed until 15 April. All enquiries to VR Une Architecture, Graphisoft R&D, Kolumbusz-utca 29, H-1145 Budapest, Hungary, tel +36 1 251 1000, fax +36 1 251 1890.

OBITUARY

Edmund Happold (1930-1996)

Edward Happold died on 12 January. He was one of the most distinguished structural engineers in the world, and a splendid person, who by energy, charm and force of character, as well as scientific understanding and professional competence, helped to transform structural engineering in the last three decades.

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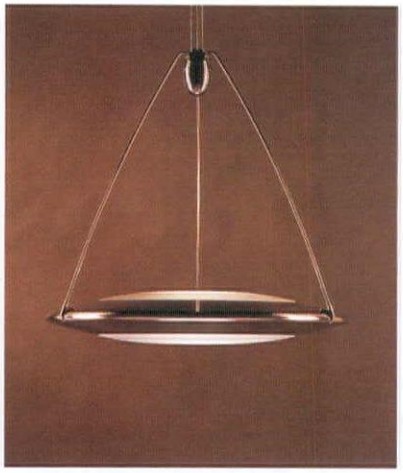
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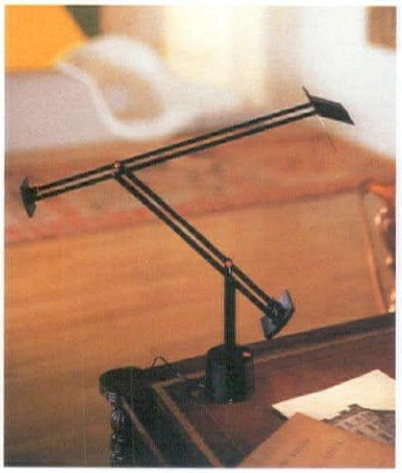
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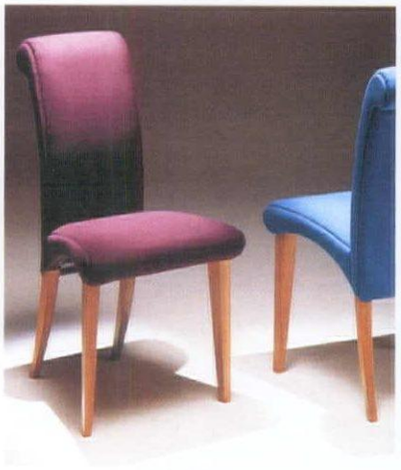

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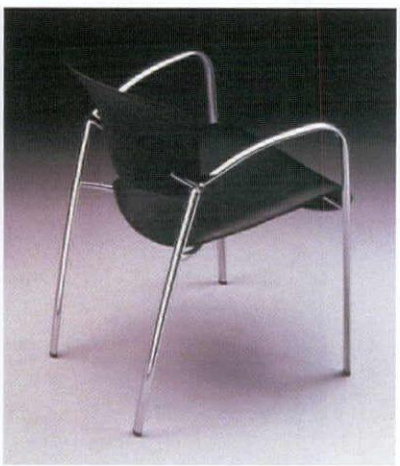
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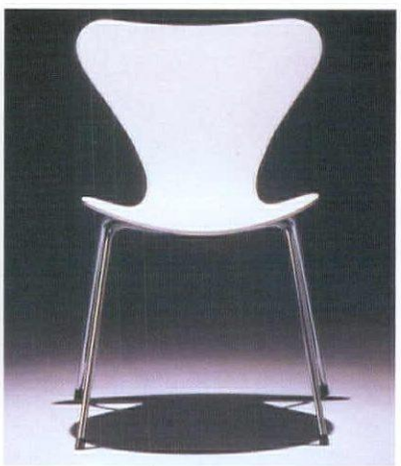
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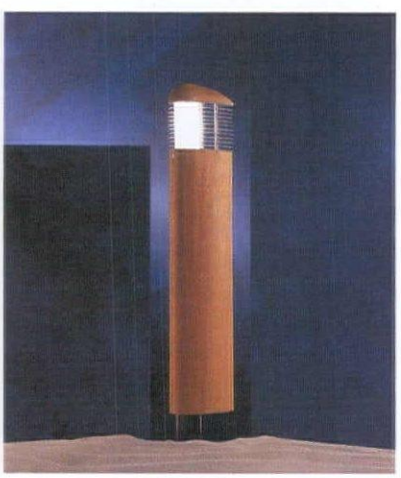
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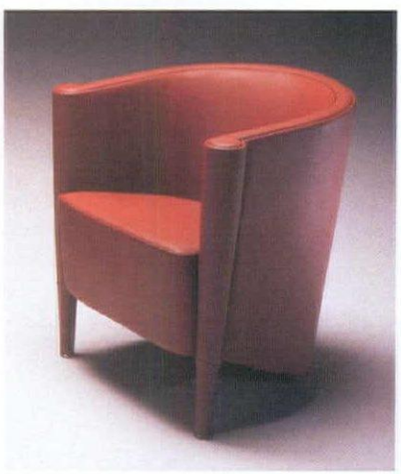
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Listeria

SIR:The English Heritage press release of 24 November 1995 which accompanies the announcement of the listing of 21 post-war buildings carries the extraordinary statement that 'many Victorians failed to appreciate Georgian buildings'.

Indeed, many Victorians hated Georgian architecture, but such demolition as took place was a very small price to pay for the vivid architecture culture of the nineteenth century. The important point here, however, is the know-it-all supposition of English Heritage's press officers that architecture can be constant in value for all time, a fact which only a handful of unenlightened souls, such as 'many Victorians', failed to realise.

This is the great illusion behind this politically-correct heritage-mania – that the practice of architecture is unconnected with great emotional, political and artistic battles, and that buildings are only of architectural value in retrospect, when they have been standing for many years.

Poor Ruskin! He 'failed to appreciate Georgian buildings'! The revolt of a lifetime against those pallid elevations and 2000 identical windows of Gower Street, those dumb blinking facades of the National Gallery and of University College, London – what an appalling waste! It took perhaps 20 years for architects to understand him, 20 years from the *Seven Lamps* to the Midland Hotel at St Pancras, to disentangle the confused emotional messages, to build visual images from literary peroration, to re-establish whole areas of industrial design, to endure patiently (as Ruskin himself warned) 'failure after failure' and to pray for 'the whole majesty' to come out of it, and to do all this with the sense of a crusade – and yet they did it; look at the frenetic red and white banding of Keble College, and you can almost see the pain that the long struggle caused.

People talked and wrote and lectured year after year, to build a culture different from that of the poverty-stricken, pox-ridden Georgian cathedral destroyers. Go back further, to Carlyle, or Burke, and you will find more evidence of those who 'failed to appreciate' the monuments of Georgian culture. And did not Jane Austen, ironically adopted in modern times as an all-time Heritage Queen, attack in *Mansfield Park* those neat white Regency cottages 'appreciated' by English Heritage? Does not *Persuasion* almost vibrate with hatred against the stage-set architecture of Bath? Was all this some massive failure of appreciation?

If you draw a distinction between architecture and the deep emotional frenzy that seeks to demolish as much as to build, you will kill the art for ever. The branch of the United Kingdom Government's English Heritage ministry that hands out liberal homilies on appreciating old buildings is an insult against architectural civilisation.

Yours etc

TIMOTHY BRITTAIN-CATLIN

Jerusalem

Change in style?

SIR: Being a long time reader of the AR, I am distressed to notice the change in article style. It seems that good journalistic skills have been sacrificed to an increased number of articles. Since many readers have backgrounds in the architecture field, surely it would benefit them more to have in-depth, constructive criticisms of the building at hand than to be given a homily of what the building is. The text has become an in-depth description of the photographs rather than an architectural criticism of the work. Could not the article on the athletics stadium in Johannesburg (December 1995) have been held over, until the project's completion, allowing the other articles the space to be expounded upon? I, as an architect, would like to know the designers' reasoning for certain design decisions. How well the building works with its users? The articles should express some of the excitement and enthusiasm felt by the architect during conception of the design. We, as a profession, are not involved in production line design and thus the AR should bear witness to this.

Yours etc

STEPHEN HERBERT

Port Elizabeth, South Africa

AR 100

AR centenary reception

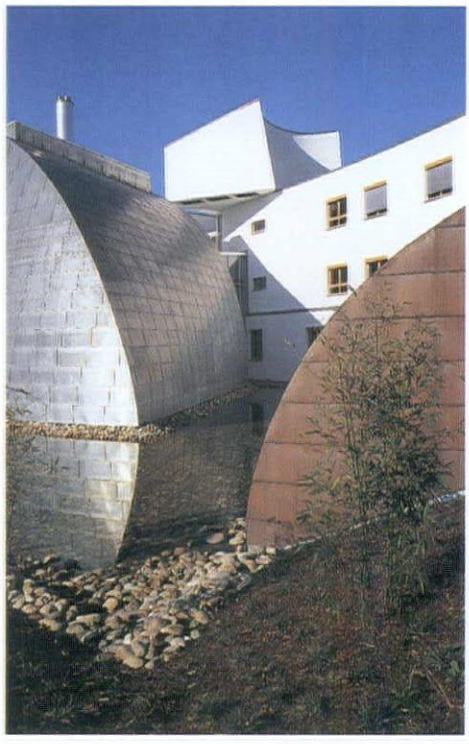
As one of the celebrations of this magazine's centenary, The Architectural Review is to hold an evening reception at the Reform Club in Pall Mall, London on Saturday 11 May between 6 and 8pm.

The Reform Club, Charles Barry's masterpiece completed in 1841, has one of the most exciting and magnificent interiors in London, and is not normally open to the public. The gathering will be in the club's library, which Nikolaus Pevsner described as the finest in the great palazzo. There will be *vin d'honneur* and canapés. Giancarlo De Carlo, Ralph Erskine, Juha Leiviskä, and Niels Torp, speakers at the international session of the Architecture Tomorrow conference, will be present informally. (The international session will be held at the Business Design Centre, Islington, London on the same day.)

Further information and tickets for the occasion can be obtained from Jackie Parry, EMAP Construct, 151 Rosebery Avenue, London EC1R 4QX for £25 each (including VAT). Cheques should be made payable to EMAP Construct Ltd. Telephone: +44 171 505 6757.

NEXT ISSUE

The creation of humane workplaces remains a perpetual challenge to both architectural and commercial imagination. Enormous changes are occurring in the design of workplaces, generated by the evolving nature of work itself, yet architectural ingenuity still has an active role to play in improving the lot of the average worker, whether in an office, studio, or factory. In the next issue we will consider some of the more inspiring outcomes of this process, drawing examples from around the world. Wiel Arets' headquarters for a management consultancy in Heerlen, The Netherlands, displays a minimalist finesse in its subtle fusion of space and light, as does Allies & Morrison's British Embassy in Dublin. Included too are Co-op Himmelb(l)au's idiosyncratic research centre at Seibersdorf in Austria, which fractures form and space to invigorating effect; also from Austria is Günther Domenig's industrial headquarters at Völkermarkt in Carinthia, one of the most dramatic workplaces ever made. Frank Gehry's communication and technology centre in Bad Oeynhausen, Germany attempts to create a sense of place and corporate character in an anonymous suburban site.
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The latest (second) issue carries articles on MIT's most recent experiments in computer-aided remote design studios, the environmentally appropriate heating and ventilating systems used by Alfred Waterhouse in the Natural History Museum in London, and De Blacam & Meagher's exploration of the typology of the library at Cork Technical College, Eire. Günter Behnisch documents the importance of Scharoun on his own work. And there are the usual authoritative reviews, critical comments and lively letters.

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buildings (projected or constructed), townscape, landscape, engineering structures, interiors/interior details

• Form

hand drawn work, made at any time, in any medium. Entries should be stiff mounted and in any size up to A2 or equivalent

• Prizes

winners will be published in The Architectural Review, be exhibited at the Architecture Tomorrow exhibition (to be held 9-11 May at the BDC in London), and will receive a 3 year subscription to the AR as well as a book of the work of Stephen Wiltshire (the prodigy whose architectural work has amazed the world). The overall winner will receive a Wiltshire drawing valued at £5000

• Entries

must arrive no later than 15 April 1996. They should be marked 'Pendock Drawing Competition' and be sent to The Editor, The Architectural Review, 151 Rosebery Avenue, London, EC1R 4QX. The author's name and address must be written on the reverse of the work. There is no entry fee

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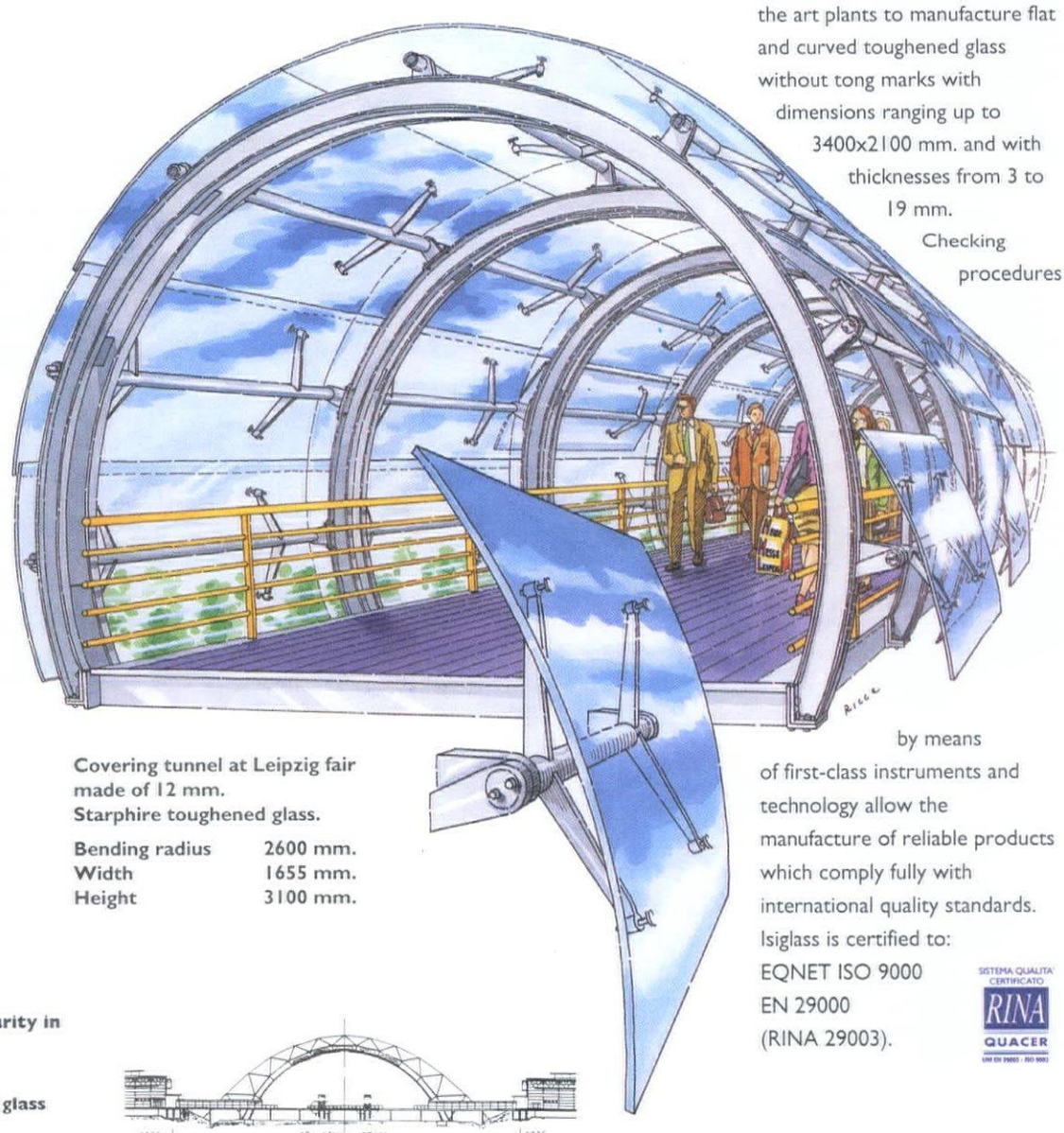
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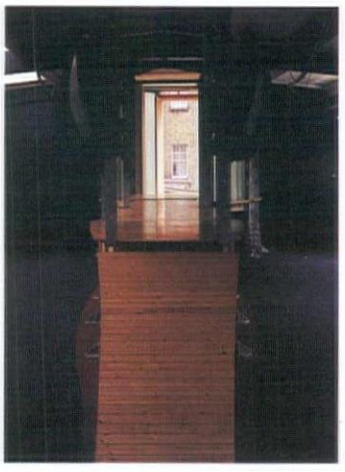
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Office insertion, London, England
Architect
Anthony Peake Associates

A tectonically expressive insertion in an architect's office provides a library and meeting space in the surreal guise of a giant arthropodal structure.

Insect house

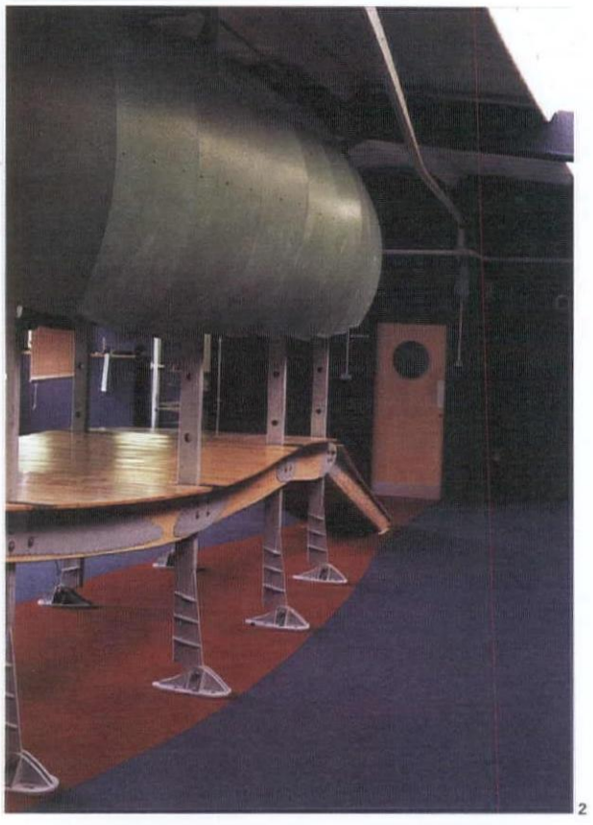
The allure of the arthropod should never be underestimated. From Michael Sorkin's beach house structures (AR November 1992) to Itsuko Hasegawa's summit centre on Mount Iwaki (AR July 1993), architecture as insect carapace continues to exude a peculiar fixation. With this new addition to their own offices, Anthony Peake Associates have enterprisingly engineered a domesticated version of international zoomorphic fetishism. Conceived as a seed insertion into an existing space, the arthropod interloper is intended to organise transient yet essential workaday office functions, such as a library and meeting room.

The new insertion consists of two parts: a biomorphic information structure to hold the practice's library (body) coupled to an elliptical meeting space (head). The entire contraption bisects the office to create a variable number of locations where workstations can plug into the information structure.

A shallow timber ramp docks into a raised platform inside the bulging carapace of the information structure. Outside, it is clad in a seductive skin of curved, segmented, pre-patinated copper panels, creating the impression of a verdigris coated chrysalis. Inside are tiers of library shelves. The platform is supported by a steel framework connected to the existing office structure. A drawbridge links the library with the elliptical meeting space, which cantilevers through the end wall of the office and is held in place by an exoskeletal steel structure. Within the meeting space, double doors open to reveal an external viewing platform which breaks through the enclosing green glass panels.

Compared with the mundanity of most office interiors, this tectonically expressive insertion inventively subverts conventional expectations, providing a functional and engagingly quixotic fulcrum to the daily working routine. C. S.

Architect
Anthony Peake Associates, London
Structural engineer
Jampel Davidson & Bell
Contractor
Claremont Construction
Copper panels
KM-kabelmetal UK
Glass panels
Regilit



2



3



4

1
Looking through the entire structure from the tail ramp.
2
The bulging carapace of the library is clad in pre-patinated copper panels.
3
Inside the library.
4
Detail of steel supports.
5
The verdigris-coated carapace is coupled to an elliptical meeting room.
6
The meeting room extrudes through the external wall.

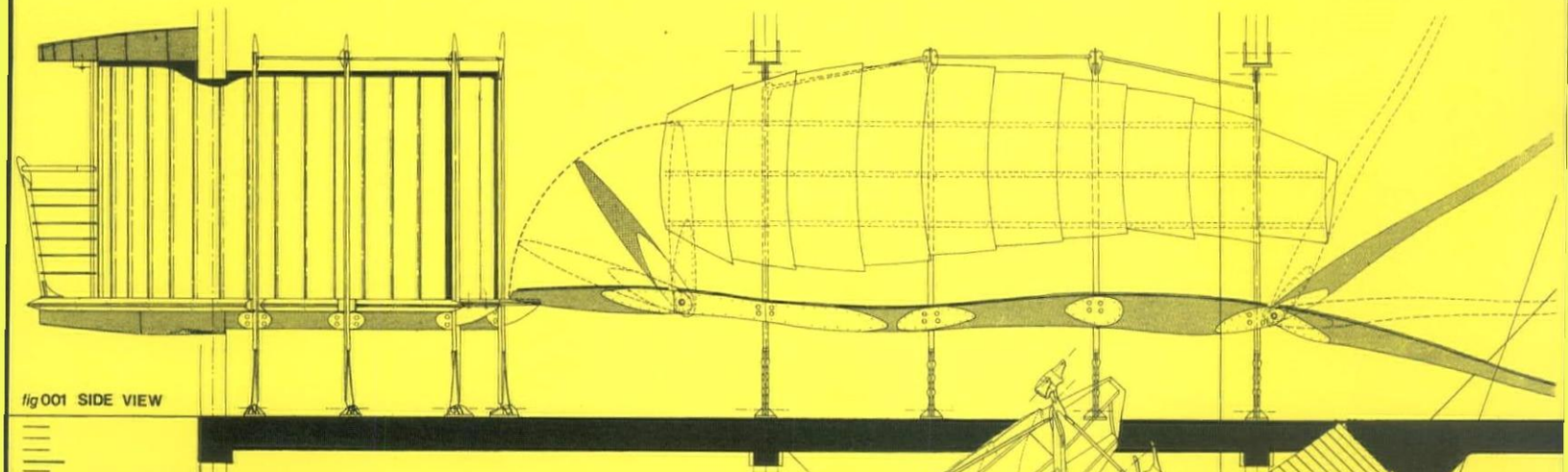
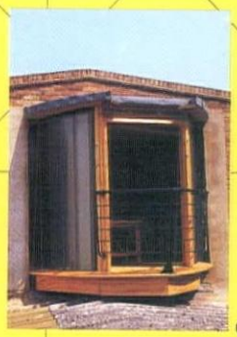


fig 001 SIDE VIEW



5



6

fig 002 · AXO VIEW

fig 003 · PLAN VIEW

fig 004 · BALCONY VIEW

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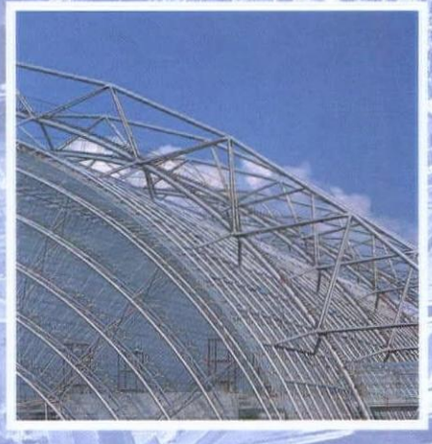
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outrage



While the British Government can be praised for wishing to increase graduate numbers, its accounting creates penitential conditions in provincial universities.

This new hall of residence for Leicester University aptly summarises the United Kingdom Government's (broadly laudable) policy of piling students high and pressing them down in an effort to increase the laughably low proportion of graduates in Britain.

Doubtless the architects, the Douglas Smith Stimson Partnership, have also been pressed down by the force of contemporary cost control and building management. Clearly, they have done their best to lighten a leaden brief by banding the brickwork and trying to invent a jaunty pitched roof. But did the block really have to quite so grim? The polychromatic banding, mean little windows and the dreary asphalt yard resemble nothing so much as those enormous philanthropic housing estates that were dumped down in the slums by the Victorians with the full force of middle-class benignity.

Doubtless it is desirable to abolish the idea of the university as a city of dreaming spires in today's ruthlessly efficient business world (or at least restrict it to the children of politicians and their wealthy friends), yet surely there should be some sort of nobility even in the meanest and most poverty stricken seat of learning. For instance, in the '60s and '70s, East Anglia, York and Stirling Universities were built on pretty tight budgets without having to descend to Gradgrindian utilitarianism.

Here, 264 students are going to spend some of the most formative and impressionable years of their lives in a building devoid of joy, grace and kindliness. If the students of today are to set standards tomorrow, how can we hope for vision? Perhaps the powers that be have decided that we can't expect much from Leicester. P.D.

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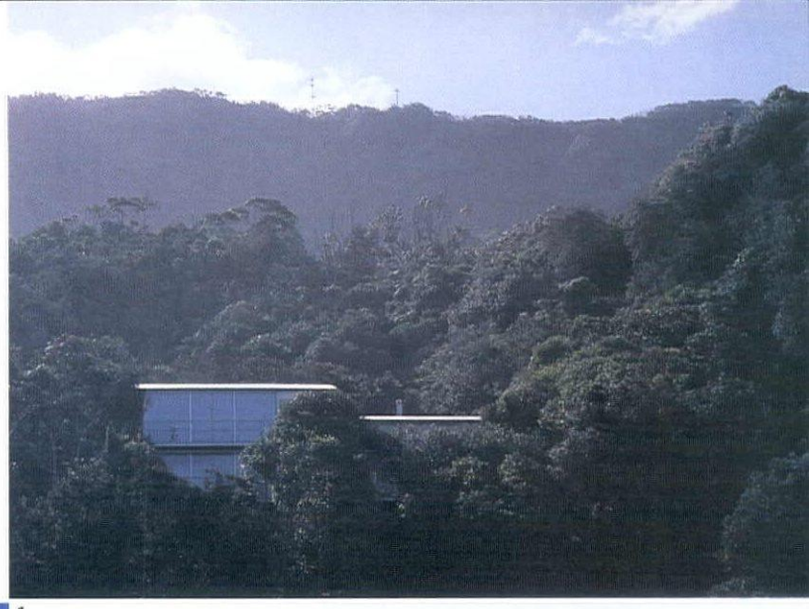
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ID INTERIOR DESIGN

House, Wombarra, New South Wales, Australia
Architect
Lippmann Associates

1
The transparent structure, barely visible, hardly intrudes on the landscape.
2
The western zone, made partly opaque by plywood panelling, contains the entrance and more private areas.
3
The eastern more transparent part of the house projects out over the sloping site, supported by steel struts.



1



2

Sea view

Set in the midst of an Australian wilderness, an elegant glass and steel house demonstrates Modernism's continuing ubiquity and adaptability.



3

Australia's verdant cities and astonishing rural hinterlands, with their unique flora and fauna, invite Modernist expression and transparency, particularly in the design of the private house. Glenn Murcutt in New South Wales has demonstrated how a Rational idiom can be adapted to a variety of contexts while evoking tradition – the rural shed, the functional structure, the verandah – and the romance inherent in the landscape.

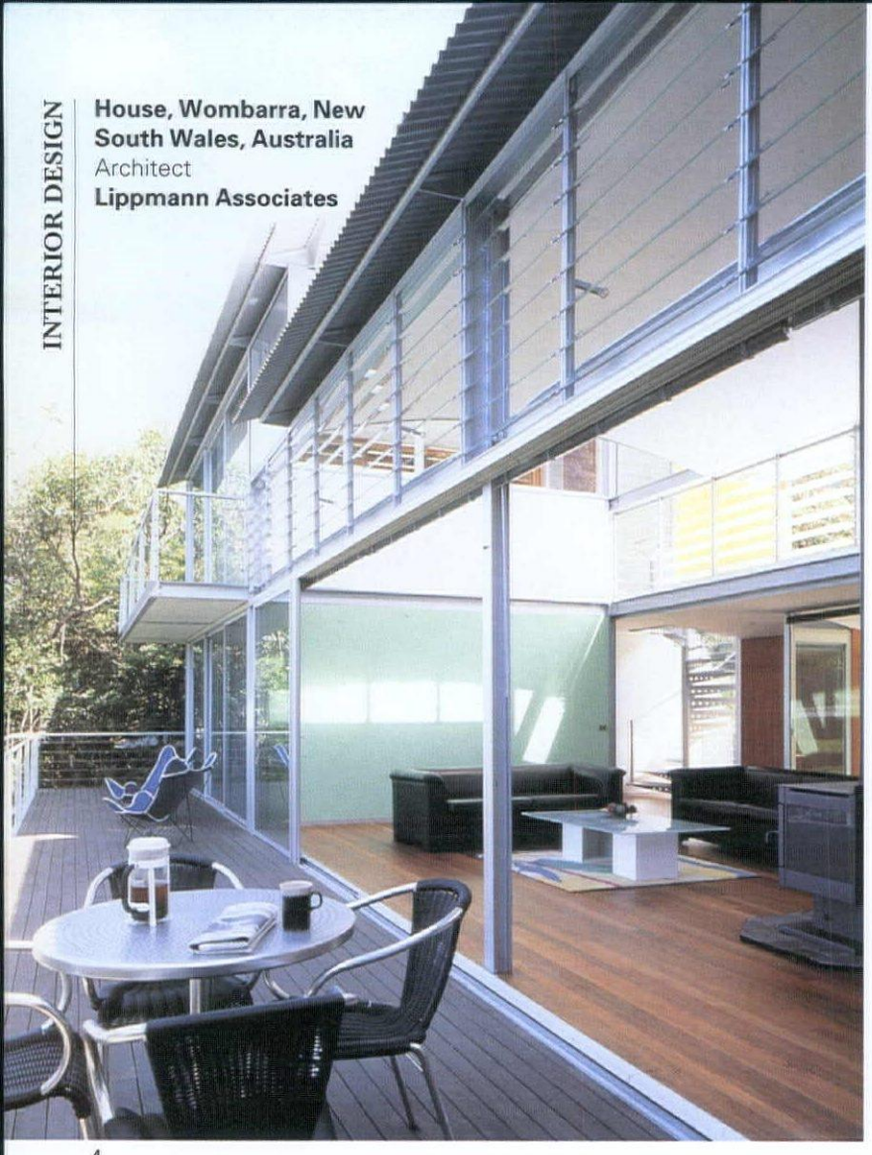
A series of houses by Lippmann Associates, also based in New South Wales, evinces similar preoccupations. For some time the practice has been developing a system of lightweight steel and glass structures that is easily adapted to the context, is durable and as maintenance free as possible.

The Cashman/Pickles House is one such and was designed as a weekend retreat for a family of four, about an hour's drive from Sydney.

Its setting is spectacular, for this glazed pavilion sits lightly and extremely privately in the midst of dense vegetation in the Wombarra nature reserve, with views to the east of the nearby beach and ocean, and on the west to mountains. The soil here is unstable and the annual rainfall high, so that geotechnical recommendations for lightweight construction coincided with the skeletal, transparent inclinations of architects and clients. They also conformed with official requirement to interfere with the site as little as possible.

Only a small part of the two acre site was suitable for building.

House, Wombarra, New South Wales, Australia
Architect
Lippmann Associates



4



5

The house is perched above sloping terrain, broad-side onto the beach and supported by steel tree-like struts which meet the ground at six points only. These direct loads to concrete piers sunk six metres down to a solid seam of coal below unstable clay topsoil.

The building, more complex than its clear modular plan and section at first suggest, has distinct zones. The eastern zone facing the sea contains bedrooms and living areas; the spaces flow out through sliding glass doors to wooden decks enclosed by spidery balustrading, or simply through glazed walls to the open air. External walls in the western zone, in parts made opaque by plywood panelling, enclose the bathrooms, laundry, kitchen and storage. The two levels are linked by a delicate, spiralling metal staircase.

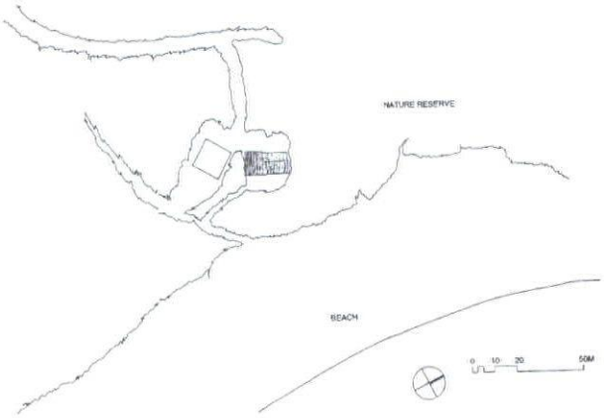
In the vertical dimension, the house becomes lighter and more transparent towards the roof where cantilevered roof beams taper to fine edges. It is naturally ventilated by means of glass louvres, and heated by a large, slow-combustion stove which radiates heat on all sides. A bio-tank breaks down waste which is used to fertilise the dense surrounding bush. Internal finishes are simple: wooden floors and painted plasterboard.

The building, says Ed Lippmann, is more or less maintenance free. Steel framing was galvanised before being bolted together on site, roof sheeting made resistant to corrosion, and plywood panels protected by marine coatings and fixed over expressed neoprene joints. Fixing holes for glazing and stud framing were pre-drilled to avoid the possibility of corrosion.

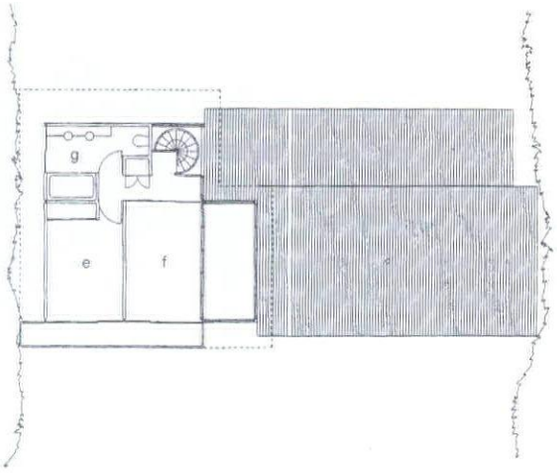
This is an immensely civilised, airy house, a sliver of glass and steel barely anchored, and barely visible in a wide view of the lush



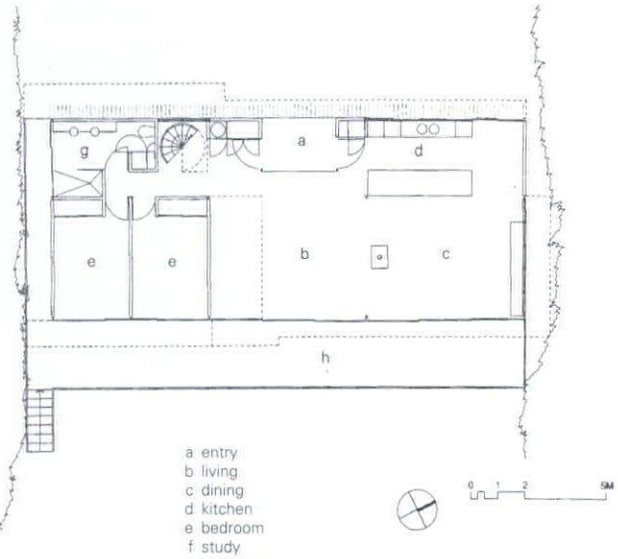
6



site plan

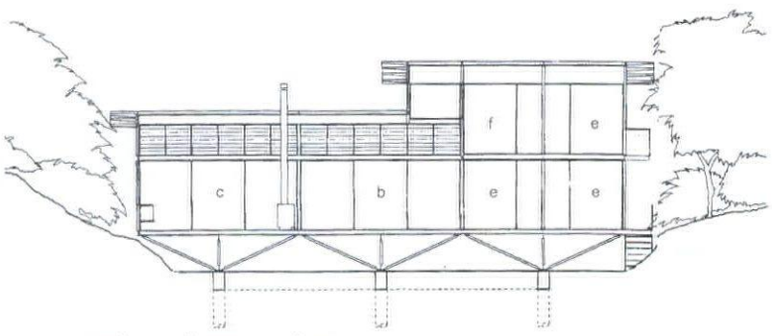


upper level plan



a entry
b living
c dining
d kitchen
e bedroom
f study
g bathroom
h deck

lower level plan



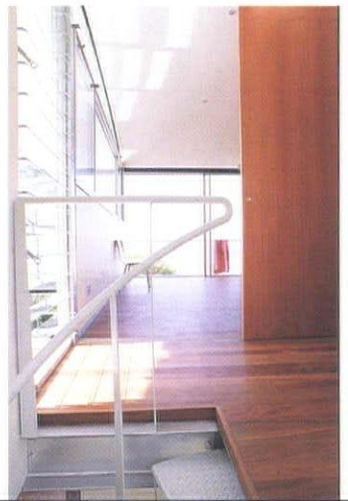
section: south-west to north-east



7



8

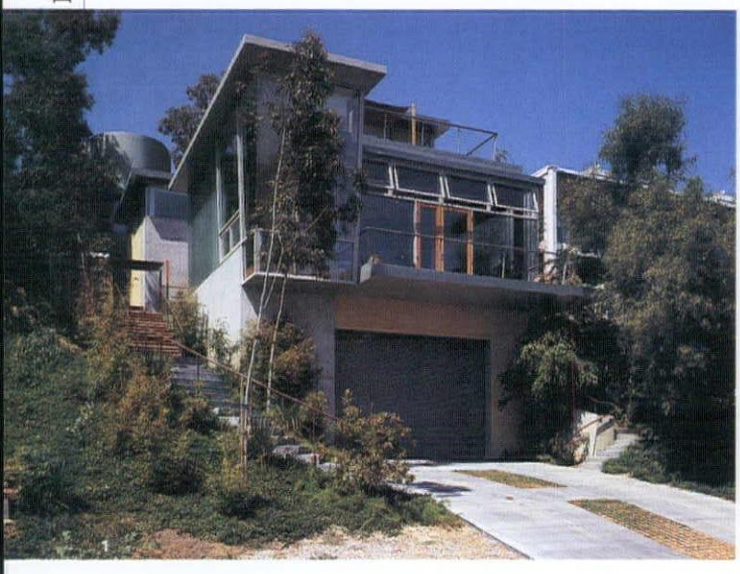


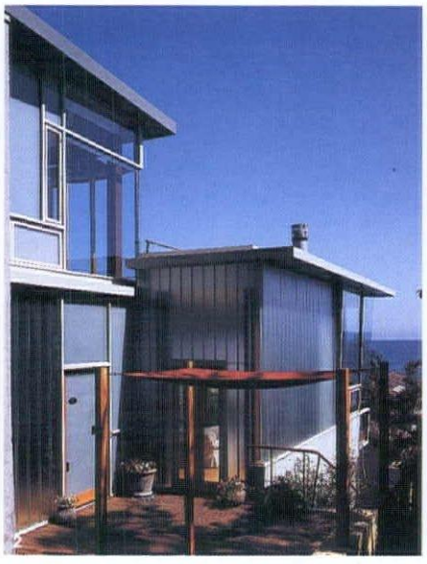
9

4
Interior spaces flow east through sliding glass doors to timber deck.
5
On east looking to beach and ocean. Glass louvres give natural ventilation.
6
The house becomes lighter and more transparent towards the roof.
7
Fittings are austere and functional, furniture classically Modernist, and finishes simple.
8
Under a curved roof sheet, the transparent upper level is contained by steel framed glazing and glass louvres, and thin balustrading.
9
The two levels are connected by an elegant spiralling metal staircase.

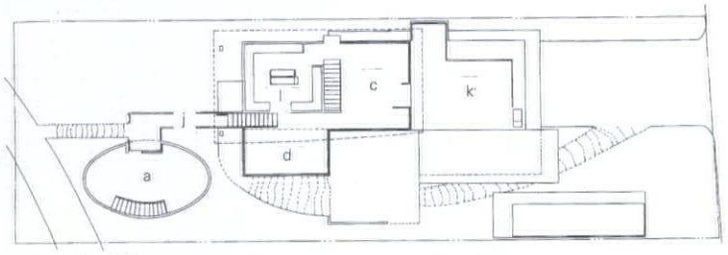
Pacific panorama

Conceived as both a shelter and outlook, this house on the edge of the Pacific Ocean turns a steeply sloping site to its advantage, in a poetic fusion of light and materiality.

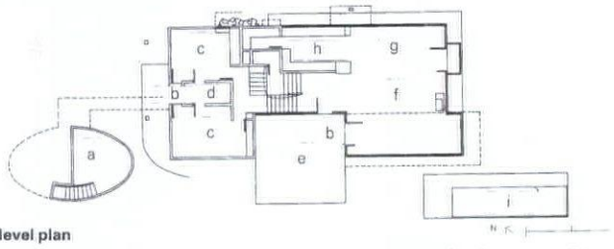






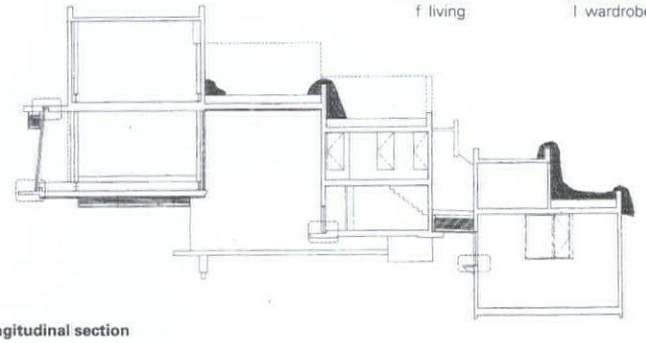


upper level plan



main level plan

a guest/studio
b entrance
c bedrooms
d bathroom
e court
f living
g dining
h kitchen
i pool (unbuilt)
j bridge
k terrace
l wardrobe



longitudinal section

A few years ago, Lorcan O'Herlihy built a Barraganesque home for his parents in the Malibu foothills. Now together with partner Richard Warner, he has completed a residence one lot from the beach which exploits a steep and narrow site by opening up its structure. The Miller Residence is a cage tuned to topography and orientation. It is about gravity and direct light and spectacular views.

Unlike many of its neighbours, the genesis of the Miller Residence is in response to soil and perimeter conditions. The site falls south towards the beach and plummets energetically with the gradient. It is thin along the contours and is serviced above and below by rough Malibu lanes. Conceptually, the house reinforces its site. It is a layering of trays from the lowermost garage through reception zones to the master suite above, after which it breaks to allow for an elliptical pavilion, an independent unit for guests. You can climb the site either externally via steps and a secluded terrace or internally via a staggered system of stairs.

The lowest level, the garage with utilities behind, is a three-sided cave with a perforated door, dematerialising when backlit. The uppermost level presents the guest pavilion as a kind of gazebo marking the property before leading one onto a private footbridge into the master suite. The house proper is arranged between these limits. The base construction is poured in-situ concrete shelving up the site both vertically and in lateral shifts so that the principal pieces of the house lock into the land. But on top of the garage, O'Herlihy + Warner switched to a steel frame. Here the opacity of shear walls gives way to a clear high internal volume that seems to suck in the Pacific ambience.

The key to this work by O'Herlihy + Warner is its section. The house is both shelter and outlook. The steel frame lifts the oceanside end high in the air to be surrounded by glass. From the lower lane – the surfers' route – it appears almost swollen. This bold crystalline box with its pattern of mullions (and soffits behind) accommodates living and dining areas on the first tray, with principal bedroom on the deck above. Spacious walk-through closets, bathroom, secondary bedrooms and a galley kitchen are tucked inland from these display

House, Malibu, USA

Architect
O' Herlihy + Warner

1, 2
Poised above the Pacific Ocean, the house exploits its sloping site.
3
Light suffuses the interior, channelled through translucent glass walls.





volumes. Doors and other interior barriers are kept to a minimum. The internal stair switches around an orthogonal core to pop from a vitreous cubicle into the master suite. From bed, the owners enjoy an ideal panorama out to the expanse of ocean beyond.

The great pleasure of the house is its maritime air. The entry patio already suggests the nautical with its variegated walls of bright aluminium – the Eames House is nearby – and an *ad hoc* little canopy. You walk directly into the living space as into a New York loft and notice the illumination. Floors are of birch ply; the frame is primer red; there are no curtains. There is clear glass towards the view with sandblasted and translucent channel glass against the flanks. A tapering fireplace posits flame against the backdrop of water – a favourite classical allusion – and in this side bay, a canting kiosk, a large window pivots up to a horizontal position. On the deck upstairs is another four-poster canopy – a little temple in the breeze – and an inserted square of pebbles. On a tight budget (for Malibu), the Miller Residence exudes firmness, commodity and delight. RAYMUND RYAN



4
The elongated dining space.
5
The eyrie-like bedroom has an ideal ocean prospect.

Architect
O'Herlihy + Warner, Los Angeles
Photographs
Tom Bonner

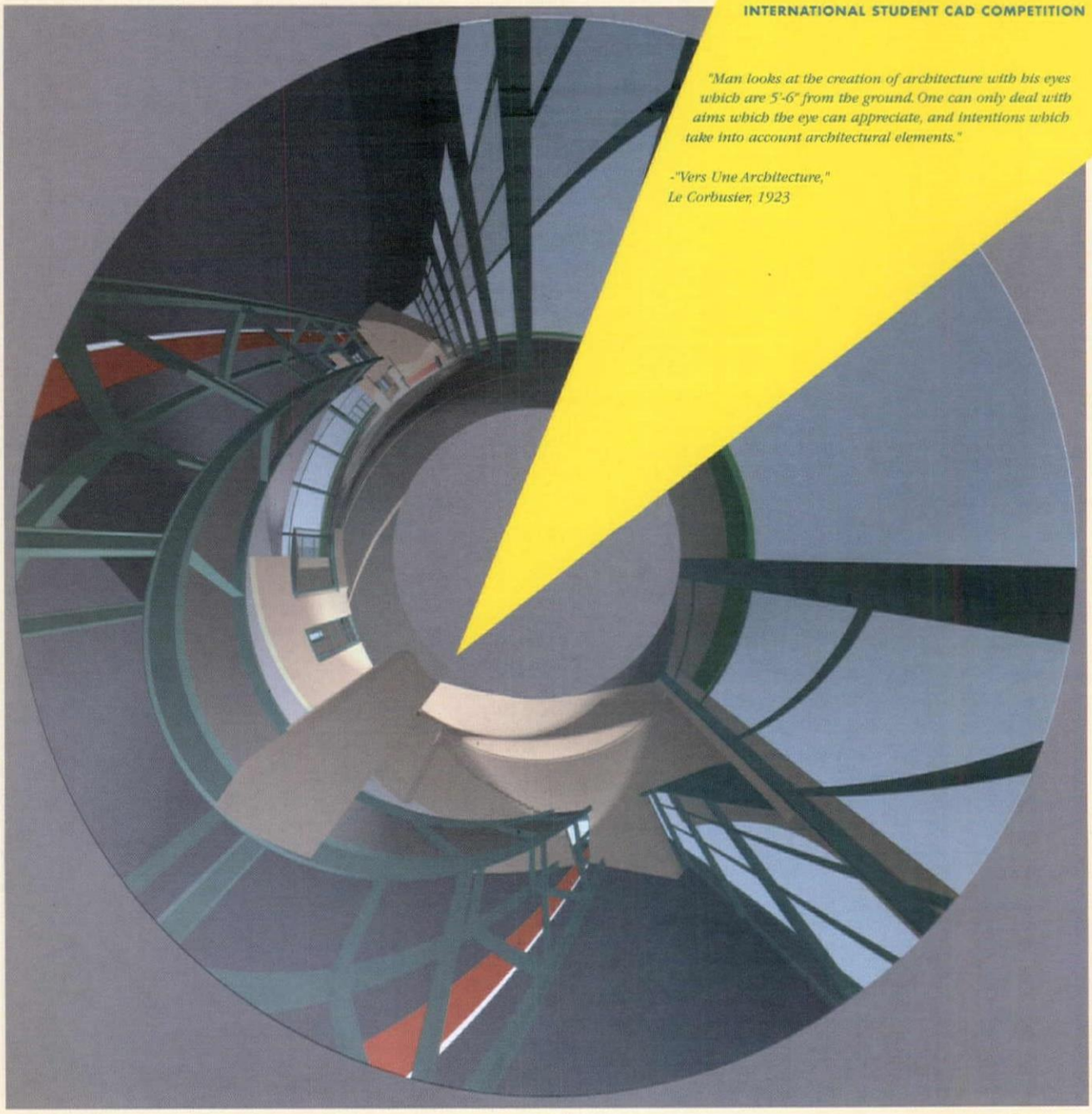
More than $50,000 of prizes will be awarded at the International Level:
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"Man looks at the creation of architecture with his eyes which are 5'-6" from the ground. One can only deal with aims which the eye can appreciate, and intentions which take into account architectural elements."

-"Vers Une Architecture," Le Corbusier, 1923



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THE ARCHITECTURAL REVIEW

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One of the most exciting recent technological achievements in the computer industry is the arrival of "Virtual Reality" on personal computers through Apple Computer's QuickTime VR technology. The potential to navigate freely within a rendered scene simply by moving the mouse creates new opportunities for the exploration of three-dimensional space. Graphisoft and the competition sponsors invite all architectural student and intern to explore the potential of this technology on architectural design and the communicate of design by participating in an international design competition.

DESIGN CHALLENGE

Using ArchiCAD as a design and modeling tool and QuickTime VR as a visualization tool, we are interested in your interpretation of works which have never existed physically or are long missing from the physical landscape, but are nevertheless real in our present day culture. We invite students to make manifest our cultural "virtual reality" by generating a computer-based "virtual reality" based on one of the following references:

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The jury will use computer files to evaluate entries. Each entry must include between five and 25 QuickTime VR scenes generated from ArchiCAD showing design intent and the quality of spaces. A three-dimensional computer model of the entire project should also be submitted in the ArchiCAD format.

SCHEDULE

- **Registration closes: April 15, 1996**
- **Submissions due: April 30, 1996**
- **International jury: May 27, 1996**

ELIGIBILITY

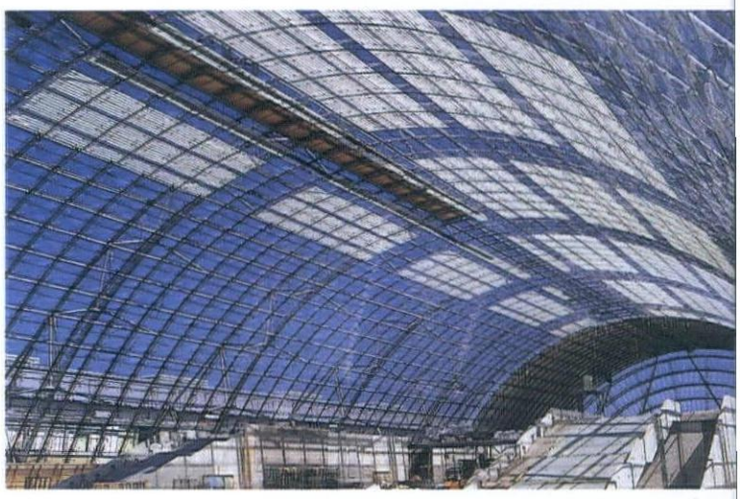
All registered full-time or part-time students of architecture, landscape architecture, interior design, urban planning, or an allied discipline. All interns who have graduated from a school of architecture within the past five years.

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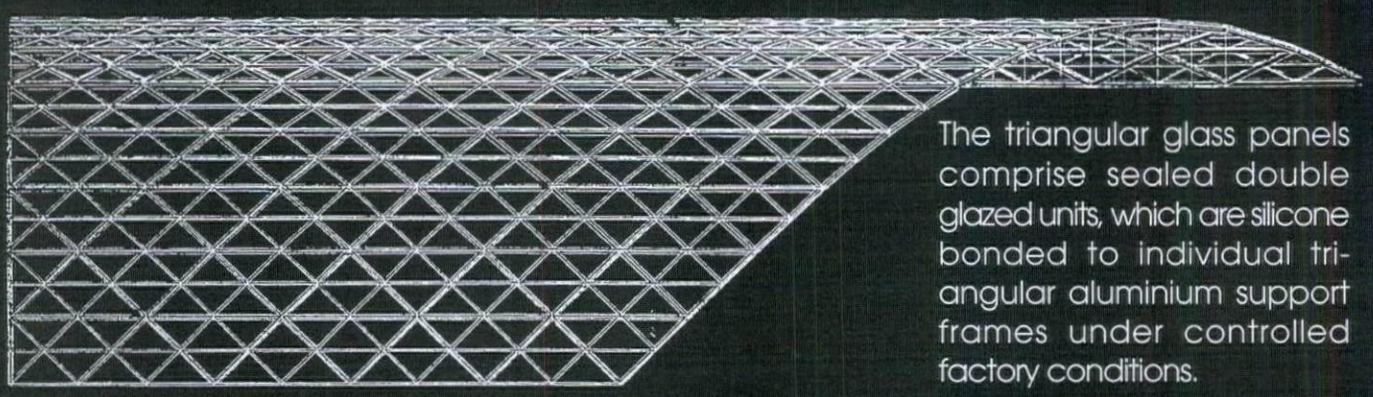
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University of Cambridge - Law Faculty



The triangular glass panels comprise sealed double glazed units, which are silicone bonded to individual triangular aluminium support frames under controlled factory conditions.



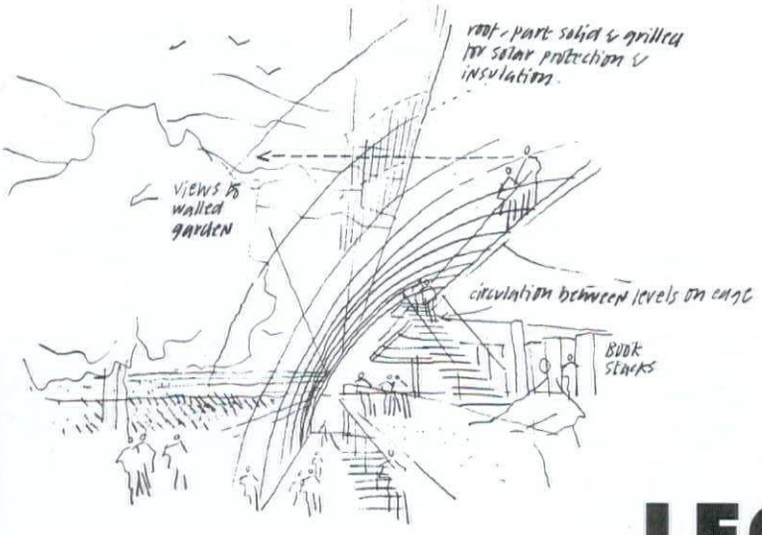
Architect: Sir Norman Foster & Partners
Photographs:Dennis Gilbert
Please also refer to Article on Page 34-41

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structural expression

This issue explores interrelationships of architecture and engineering: the effects of new techniques and ideas on building. Engineering input is not restricted to the structure but covers a range of disciplines, for instance in Foster's Cambridge Law Faculty (over page), Bruder's Phoenix Library (p48), Ritchie's great glass hall (p74) and Giencke's gymnasium (p62). Nor is engineering seen simply as a means of manipulating metal and glass: both Samyn's seed house (below and p68) and the bridge by Meili and Peter illustrate departures in timber construction, and Grimshaw's Eden project (p65) shows the potential of new plastic skins.





Law faculty, Cambridge University, England
Architect
Sir Norman Foster and Partners
Criticism
Alastair Best

Tactfully inserted into Cambridge's evolving Sidgwick Avenue campus, Norman Foster's new Law Faculty is a confident, expressive articulation of space and structure.

LEGAL PRECEDENT



1

Post-war Cambridge has built in haste, and repented at leisure. There is perhaps no better setting in which to examine the follies, extravagances and occasional triumphs of contemporary British architecture. Cambridge can make – or unmake – an architect's reputation. But it is the city and the university that have had to put up with the long term consequences of a prolonged and enthusiastic flirtation with architectural superstars. Considered *en masse*, the results can be disheartening. That, at any rate, was the conclusion reached by Philip Booth and Nicholas Taylor in their *Guide to Cambridge New Architecture* (1972). Even today, after the healing interval of 20 years, it is hard to disagree with their conclusion that the huge influx of post-war talent has led 'not to an enriched environment but to confusion and overstatement'.

There are few better places in Cambridge to study this confusion and overstatement than the Sidgwick Avenue site. Long ago, Nikolaus Pevsner argued that Cambridge's future lay beyond the Cam 'in a campus more beautiful than any in America, a precinct much larger than the precincts of the individual colleges, yet a precinct all the same'. Sidgwick Avenue was to become Cambridge's intellectual theme park, with the individual arts faculties mimicking in their layout the format of the colleges – and by implication vying with them as a focus of learning.

Hugh Casson's masterplan and finished buildings, though much derided at the time for their picturesque obsessions with cobbles and bollards, and finicky fenestration, were true to the spirit of such a collegiate campus. And

1
The south elevation of the new Law Faculty, a reductivist essay in reconstituted stone and opaque glass panels coloured a delicate Cambridge blue. Entrance is demarcated by a slender steel column.
2
The glazed west elevation is splayed at a 45 degree angle to create a breathing space between the existing buildings.



Law faculty, Cambridge University, England
Architect
Sir Norman Foster and Partners



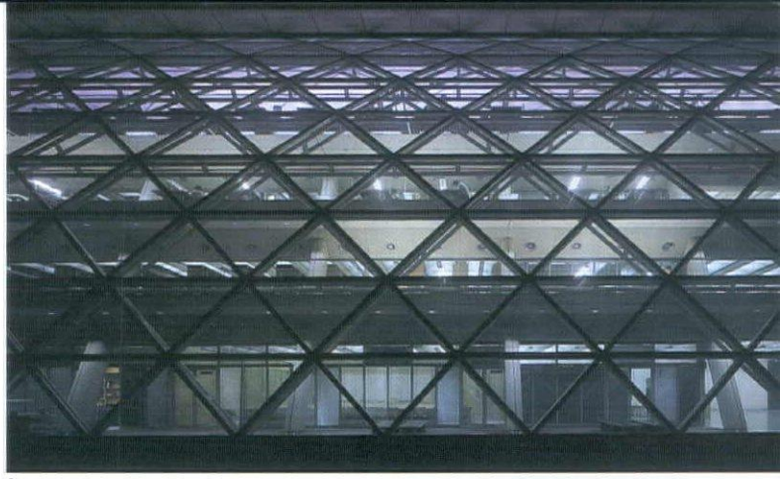
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although the gale-swept 'cloister' running beneath the raised faculty blocks is no place to linger on one of Cambridge's more Siberian winter afternoons, this is an honourable and largely successful piece of townscape in the Cambridge idiom of turf and paving, open and enclosed space. One can have too much of a good thing however, and it is perhaps fortunate that the Casson Conder scheme was not allowed to extend all the way to West Road. The rivalries and trade-offs between dons and departments on one hand, and colleges who own most of the land, on the other, have always put paid to comprehensive thinking on this scale. In consequence, many contemporary buildings at Cambridge stand shoulder to shoulder and ill at ease, like VIPs at a cocktail party who have not been introduced to one another. At Sidgwick Avenue, James Stirling's angry red History Faculty was clearly not on speaking terms with anybody; and so it has fallen to Norman Foster on the adjoining site to effect a few introductions.

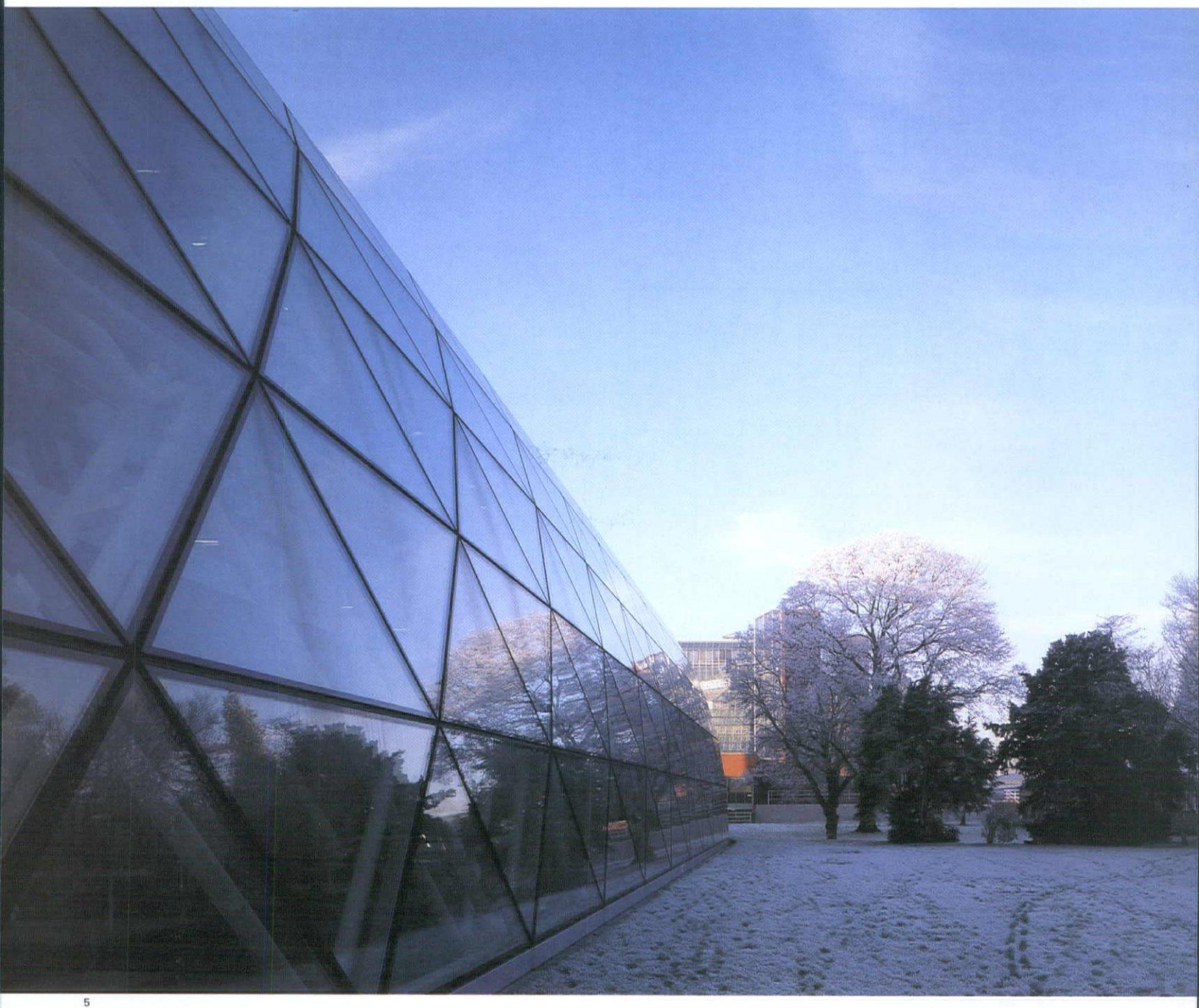
Given Cambridge's long-term fixation with glamorous architects, it was obvious that sooner or later Foster would land a commission here. The question to be asked is, has yet another intervention from a brilliantly talented outsider merely added to the confusion and overstatement which is already rife at Cambridge, or has there been a genuine gain? The first thing that needs to be said of the new Law Faculty is that quite apart from its merits as a building – which are considerable – it is a tactful insertion into a very difficult site. To build opposite the History Faculty must be the architect's equivalent of donning the shirt of Nessus. In form, materials and orientation, Stirling's glowering masterpiece is a calculated snub to the Casson Conder block next to it and a threat to anything which might be placed in the immediate vicinity. One of Foster's achievements has been to establish, or in



4



6



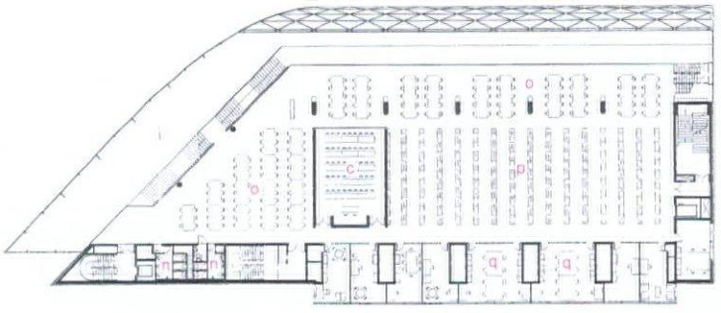
5

3
The building tactfully takes its place in the original Casson Conder masterplan, which successfully explores the Cambridge idiom of turf, paving, open and enclosed space. Casson Conder's raised faculty block to left.
4
Foster's cool newcomer provides a soothing contrast to Stirling's glowering History Faculty.

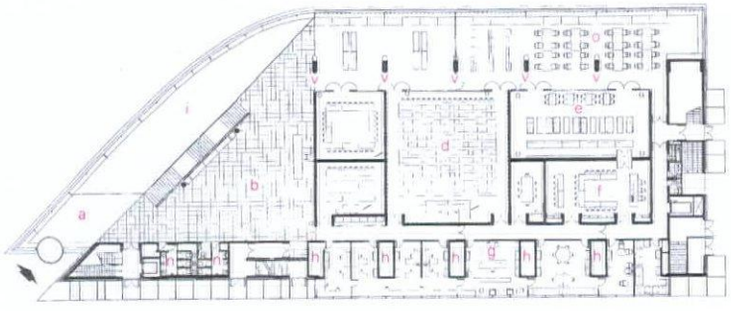
5
The north elevation: a glazed curving volume that is neither wall nor roof nor window, but a subtle abstraction of all three.
6
Triangulated Vierendeel structure permits repetitive use of a single glazed panel size.

Law faculty, Cambridge University, England
Architect
Sir Norman Foster and Partners

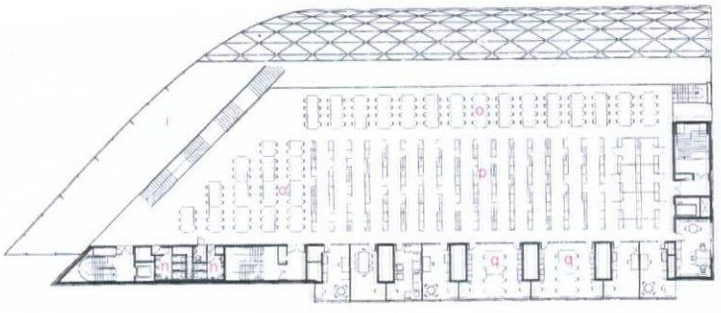
a entrance
b foyer
c seminar room
d lecture theatre
e staff common room
f moot court
g faculty offices
h risers
i void
j student common room
k book storage
l access to lecture theatres
m library reception
n wcs
o reader seating
p book stacks
q carrels
r compact book storage
s microform room
t photocopy room
u computer catalogues
v raking columns



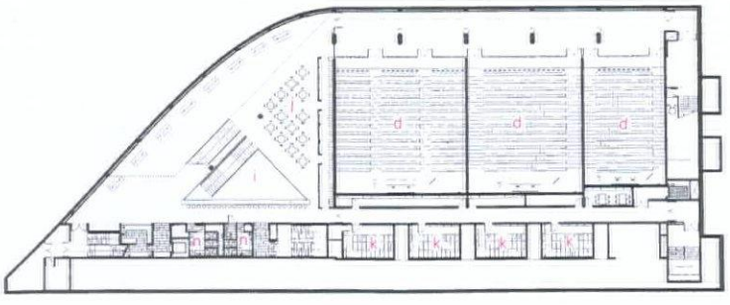
third floor plan



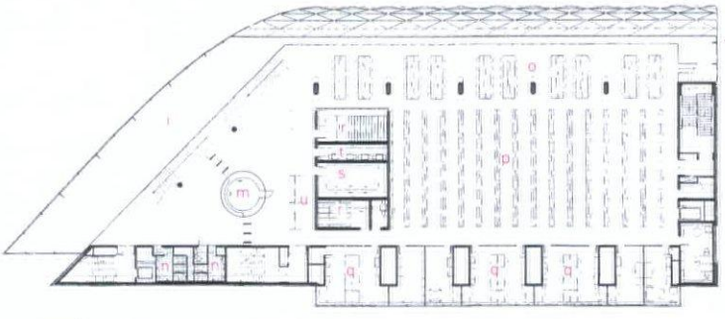
ground floor plan (scale approx 1:750)



second floor plan

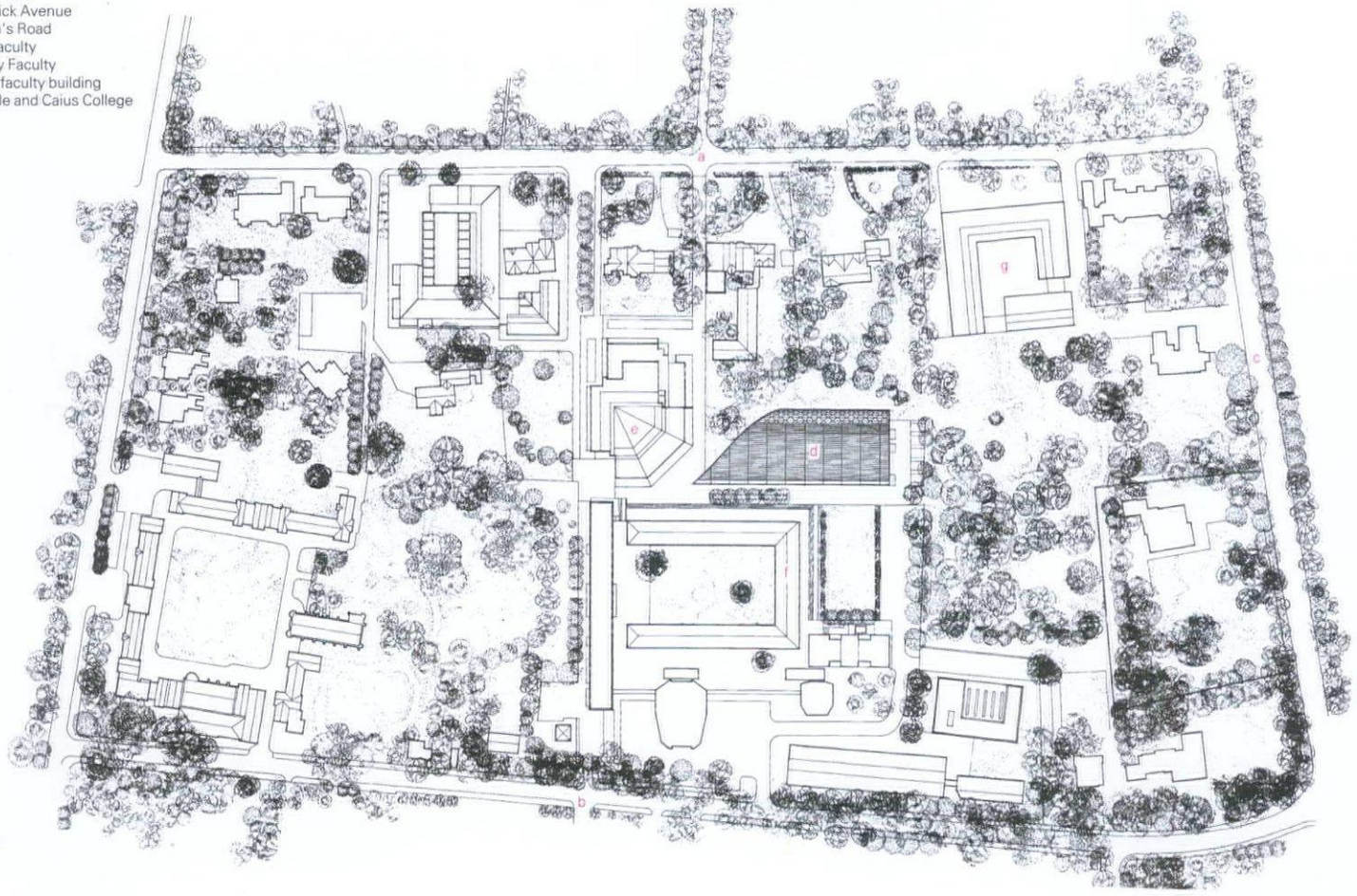


lower ground floor plan



first floor plan

a West Road
b Sidgwick Avenue
c Queen's Road
d Law Faculty
e History Faculty
f raised faculty building
g Gonville and Caius College



site plan

some cases, reinstate, a coherent north-south axis through the Sidgwick site; and by splaying the form of his own building at 45 degrees to match the History Faculty and avoid a few listed trees, he has created a breathing space – not quite courtyard, not quite square – in which all the buildings can co-exist in something reasonably close to harmony. Part of this sensitivity to site may be due to Foster's Cambridge-educated partner in charge, Spencer de Grey.

The Casson Conder raised faculty block is a particular beneficiary. Foster and de Grey have restored the stepped plinth on the western side and clad the Law Faculty's southern elevation in reconstituted stone and Cambridge blue panels of opaque glass with narrow clear glass vision strips. The two blocks are in dialogue, and will get on even better when the trees between them have a chance to mature. It is obvious already from this that the Law Faculty is a contextual building whose forms and materials have been influenced by its neighbours. The flat southern facade and the splayed western wall are the direct response to context. Only on the north elevation where the view consists of mature trees and (eventually) a lot more Foster buildings, has Foster had a chance to flex his muscles.

The result is one of those *tours-de-force* in steel and glass which is neither window nor wall nor roof but all three. Moreover its abrupt termination along the southern facade gives a hint of what might have been – an all-embracing steel and glass enclosure vaulting effortlessly over the bookstacks within.

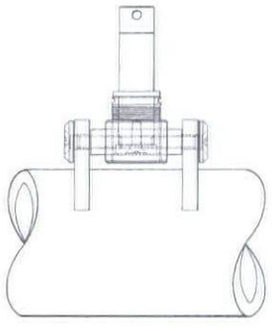
As built, perhaps the most delicate design problem has been to bring the disjunctive north and south facades together. This has been done by creating a prow at the western end of the building with an array of mullions stepping up to meet the curved edge of the steel truss. The wedge-shaped glazed atrium thus formed acts as the entrance, meeting place and collecting point of the whole building.

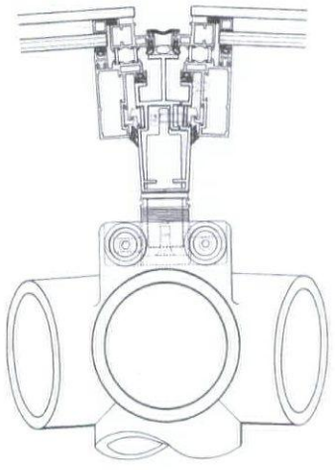
Entrances have not always been Foster's strong point. One recalls the hard-to-find, almost apologetic hole in the wall to the Sainsbury Centre, when the natural point of entry – since recognised by Foster himself – was surely the glazed southern end. At the Law Faculty, the entrance is certainly at the logical point on the campus – any *feng shui* spin doctor would have agreed on that. The problem is that it is also marked externally by an unexpected collision of forms and materials. There is a distinctly un-Fosterlike grinding of gears as steel roof truss, stone elevation and glazed wall all come together. This entrance is celebrated – if that is the word – by a slender steel column whose significance is obscure. Is it depending from the eaves as a tie, or is it lending structural support? The answer is neither. Apparently the sole justification for this insouciant appendage is that the entrance looks somehow incomplete without it.

Internally, the entrance foyer/atrium is certainly going to be seen as one of Cambridge's big interior set pieces. But because part of it is sunk below ground level, the visitor disconcertingly finds himself staring into a kind of trench for which, as yet, no satisfactory use has been found. The problem is one of conflicting functions. The faculty combines a library with teaching spaces. Undergraduates collecting outside the basement lecture halls, or milling around the entrance are apt to be noisy, whereas libraries traditionally demand silence. Any attempt at enlivening this void – by, for instance, filling it with paintings and sculpture, or a full-blooded canteen – would simply exacerbate what the faculty at present regard as a noise problem. Their fears may be exaggerated, however. On a recent visit, I found a lively seminar in progress with both doors open to the library spaces beyond. Nobody seemed to object to this, indeed it is possible that a certain amount of white noise may be beneficial, and that the gradual transfer from books to terminals may generate new patterns of study and new

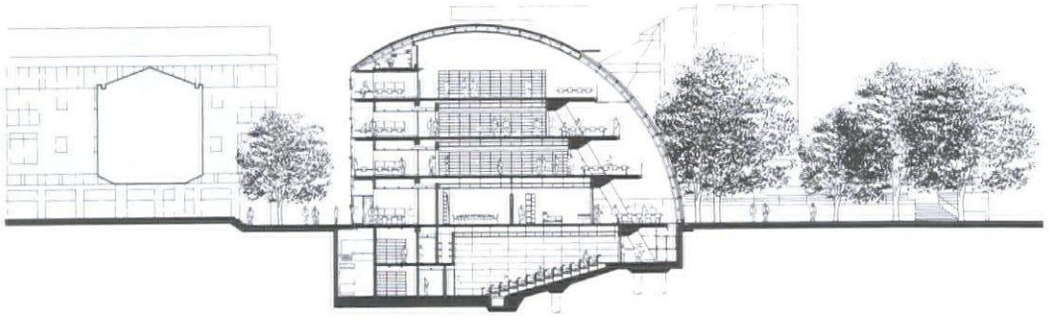
STRUCTURE AND CONSTRUCTION

The structure has been engineered by YRM Anthony Hunt Associates and incorporates both in-situ and precast concrete elements to achieve a high degree of tolerance and quality of finish.
From the bored piling and deep basement construction, five raking columns rise to support the northern edge of each floor. Precast beams then allow these floors to span, uninterrupted, to concrete riser cores which support and brace the southern perimeter of the structure. The concrete floors are enclosed above ground by a triangulated steel Vierendeel structure, cylindrical in section, to which the cladding systems are fixed. This triangular format allows the repetitive use of a single glazed panel size and has been developed with YRM Anthony Hunt Associates to maximise structural efficiency.
Externally, the curved layout of the north facade's structural silicone glazing develops into a stainless steel roof above. The east and west facades are also finished with glass, treated to combat solar heat gain and glare. The west wall forms a sinusoidal curve in plan – a function of the triangular steelwork geometry. The vertical south facade is clad in reconstituted Portland stone reflecting the solid form of the existing faculty building opposite. The Law Faculty offices are then clad with translucent glazing with clear horizontal vision strips which also incorporate opening windows for natural ventilation. TONY HUNT





junction of steelwork node and cladding



cross section

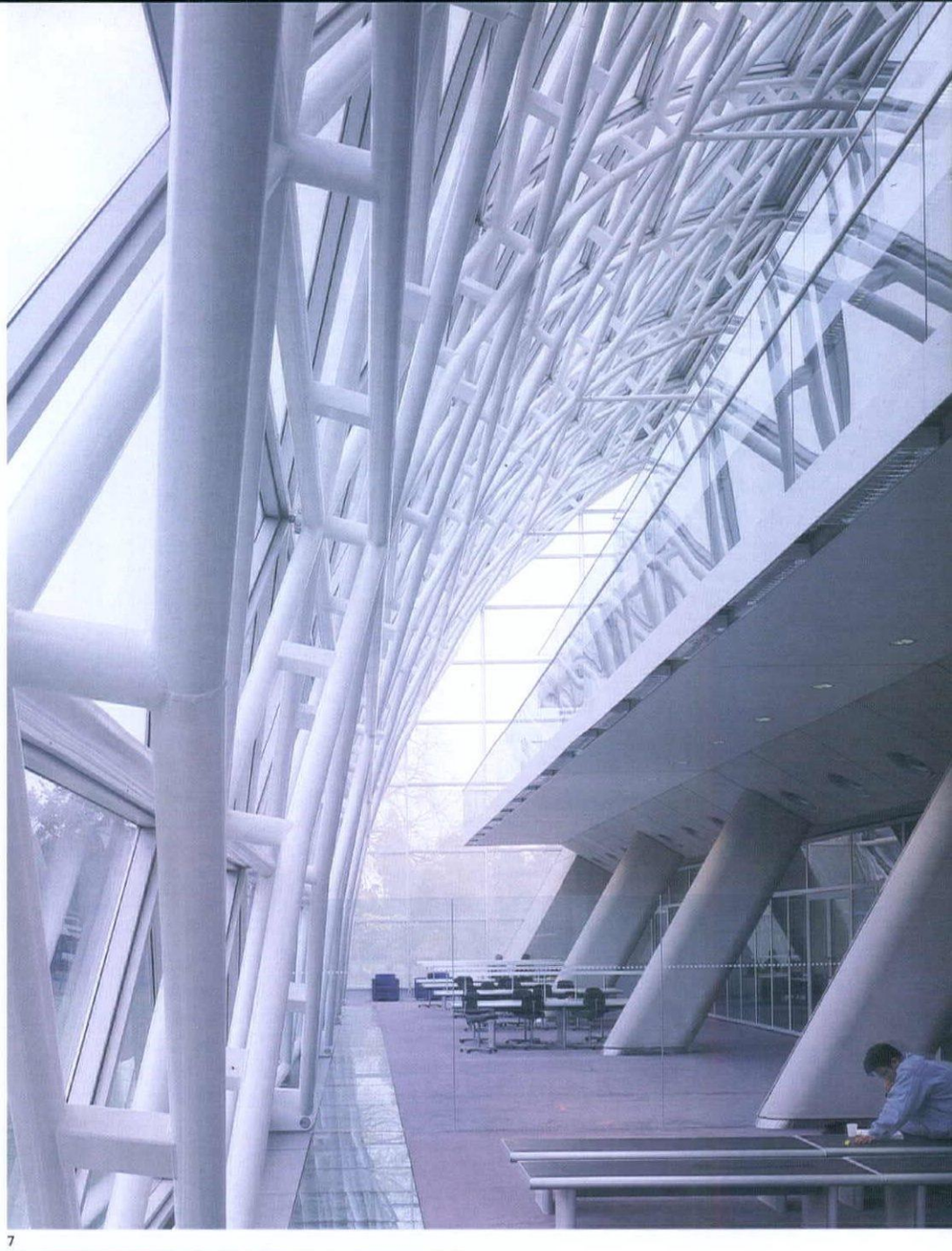
Law faculty, Cambridge University, England
Architect
Sir Norman Foster and Partners

tolerance of extraneous sound.

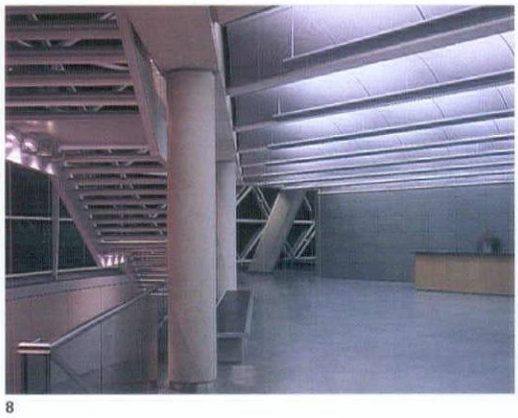
The library is the most satisfying part of the building, although the volume devoted to book storage and book study probably amounts to less than a third of the total. As always in a Foster building, there is much sensuous pleasure to be had from the way things have been put together. The continuous reading tables are closely based on the desks in Foster's own office. A shelving system in solid birch (manufactured in Italy and due to go into mass production soon) alternates with vaulted corridors where the lighting levels obligingly increase as the reader enters the bookstacks. Most remarkable of all, is the beauty and uniformity of the concrete, achieved by steel shuttering and a bulk purchase of Scottish granite aggregate.

Characteristically the concrete performs more than one task: as well as holding up the library, it carries communications, fire alarm, and security system points cast within it, while its heat retentive mass plays a key part in controlling the effects of solar irradiation.

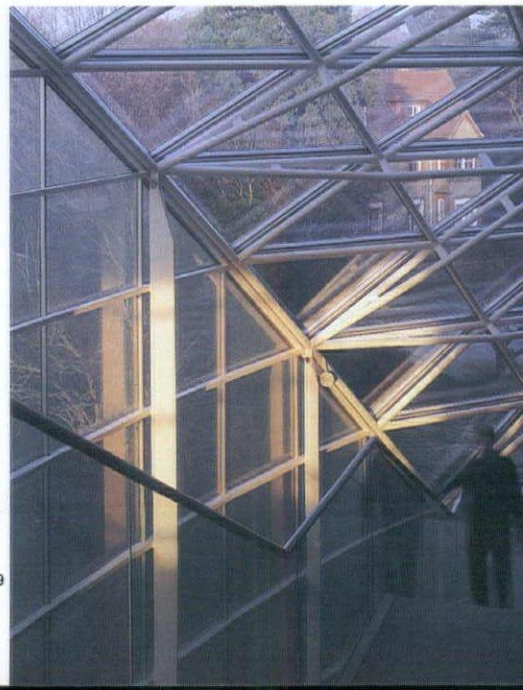
In general this building inspires feelings of modified rapture. It is a confident, sweetly functioning work of architecture, which without being in the least self-effacing is a surprisingly tactful addition to the Sidgwick Avenue campus. But something is missing. There is a lack of fluency, a lack of *élan* and a disturbing muscularity in some of its components that seem uncharacteristic. It will be fascinating to see how Foster manages to knit together his Law Faculty with the next phase – a more restrained group of barrel-vaulted faculty buildings for English and Criminology. These will bring the Sidgwick Avenue complex right up to West Road, and reinforce the north-south axis of a campus which, one day, will surely run all the way up to the University Library itself.



7



8



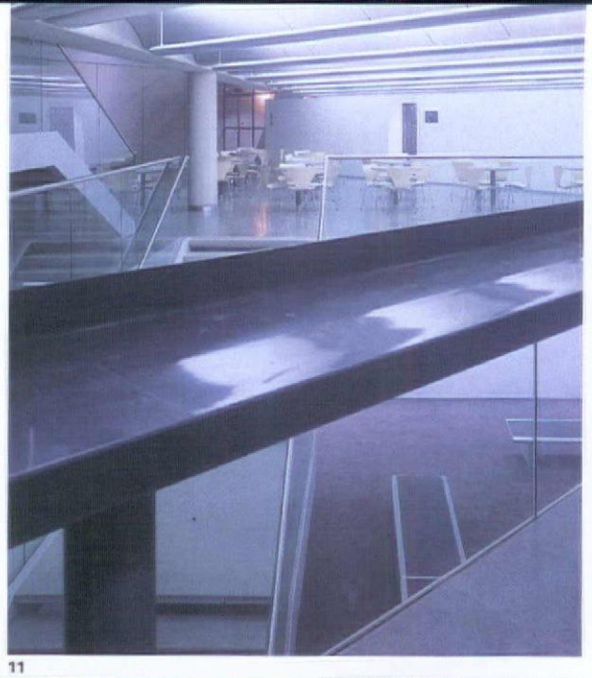
9

7
The great glazed vault. Five raking columns rise to support the north edge of the floors.
8
Entrance foyer.
9, 10
The main staircase tumbles down through the void – a breathtaking formal set piece reminiscent of the Nîmes Médiathèque.



Law faculty, Cambridge University, England
Architect
Sir Norman Foster and Partners

Architect
Sir Norman Foster and Partners, London
Project team: Norman Foster, Spencer de Grey, John Silver, Chris Connell, Michael Jones, Mouzhan Majidi, Giuseppe Boscherini, Angus Campbell, Glenis Fan, Jason Flanagan, Lucy Highton, Ben Marshall, Divya Patel, Kate Peake, Victoria Pike, Austin Relton, Giles Robinson, John Small, Ken Wai, Cindy Walters, Ricarda Zimmerer
Quantity surveyor
Davis Langdon & Everest
Structural engineer
YRM Anthony Hunt Associates
Project team: Alan Jones, Jeremy King, Alan Smith, John Partridge
Services engineer
YRM Engineers
Landscape architect
Cambridge Landscape Architects
Main contractor
Taylor Woodrow Construction Southern
Fire engineering
Ove Arup & Partners
Photographs
Peter Cook



11



12



13

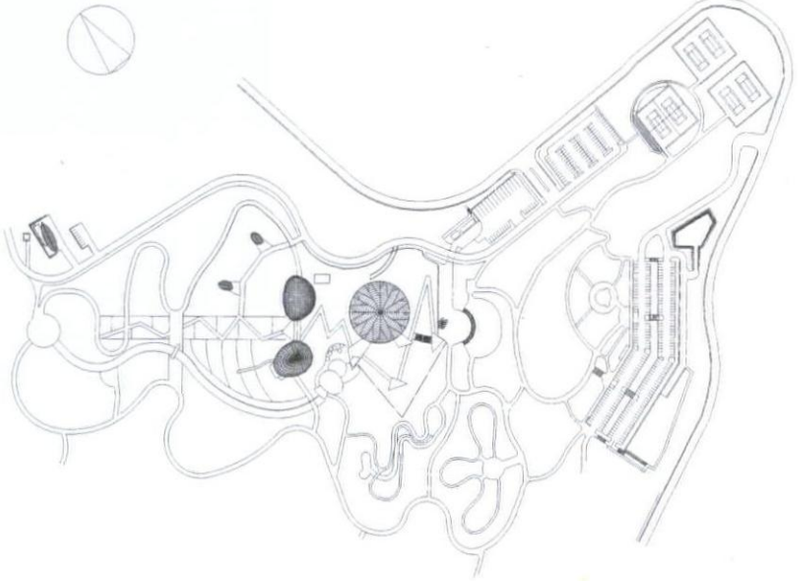
11
Part of the café on the lower ground floor.
12
Havens of study in the library, with custom designed continuous reading tables.
13
One of the subterranean lecture theatres.

FRUITFUL SYNTHESIS

A new museum complex in Japan devoted to the study of fruit in all its manifestations embodies a reciprocity between nature and technology that generates some remarkable architectural forms.



1



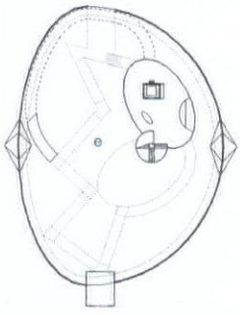
site plan

Museum of Fruit, Yamanashi, Japan
Architect
Itsuko Hasegawa

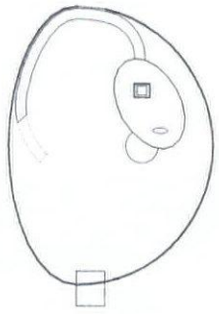
1
The new museum lies on sloping terrain, surrounded by vineyards and within sight of Mount Fuji.

Yamanashi Prefecture, lying to the west of Tokyo, is one of the most intensive producers of fruit in Japan. The Museum of Fruit, designed by Itsuko Hasegawa, forms part of a new public park in the town of Yamanashi. Although a slightly surreal sounding concept, the museum is dedicated to the study and exposition of fruit and fruit culture. The shallow sloping site, which is surrounded by vineyards, lies on the edge of the Fuefuki River, with views of Mount Fuji in the distance. The museum takes the form of a group of shelters scattered around the site. This fragmented arrangement can be

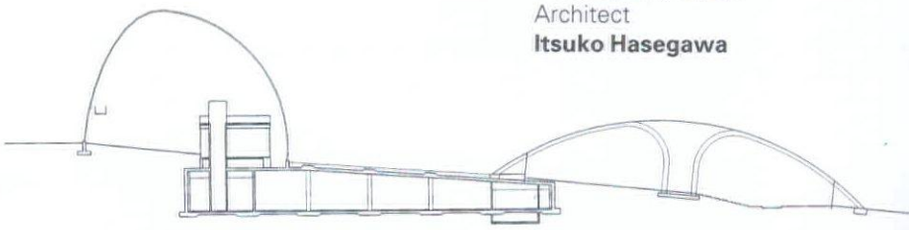
Museum of Fruit,
Yamanashi, Japan
Architect
Itsuko Hasegawa



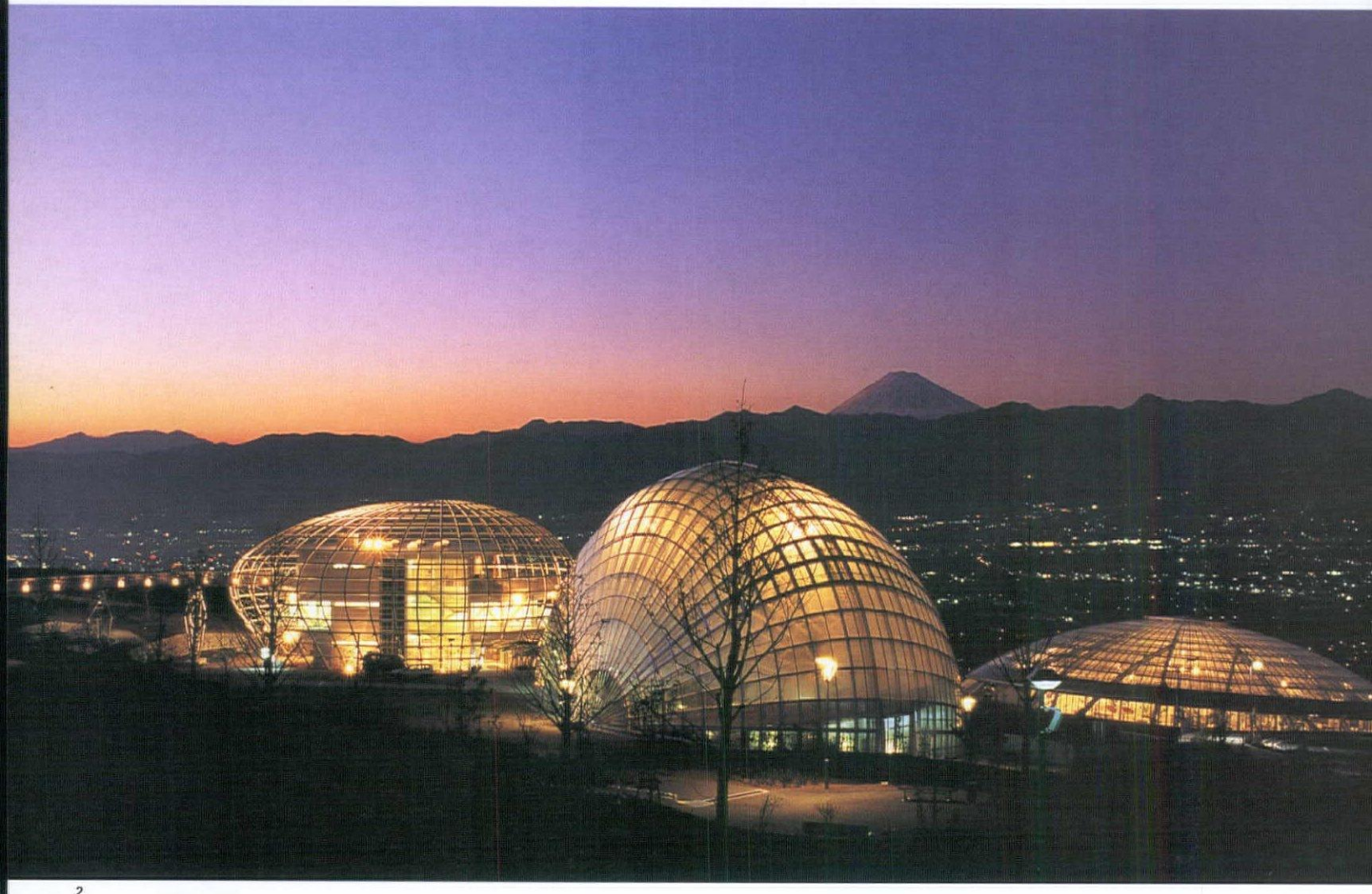
greenhouse: ground floor plan
(scale approx 1:1000)



first floor plan

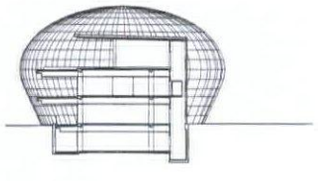


cross section through greenhouse and event space

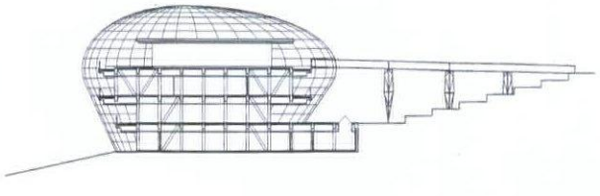


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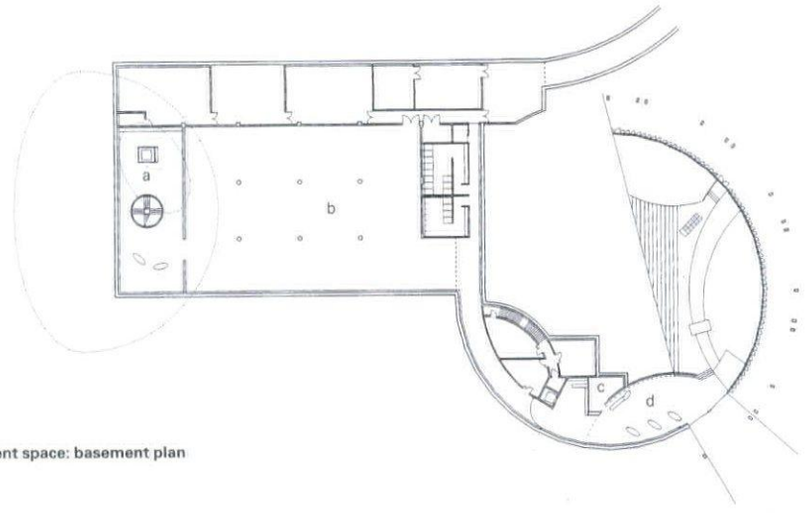
2
A trio of steel domed structures make up the museum complex. From right to left – workshop, greenhouse and event space.
3
The saucer-shaped dome of the event space.



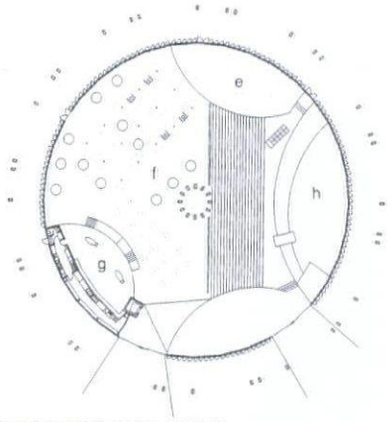
cross section through workshop



long section through workshop



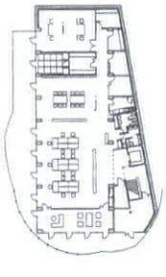
event space: basement plan



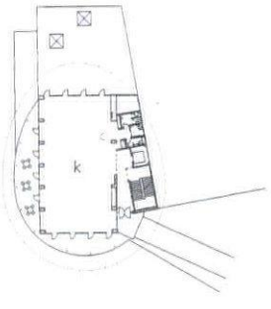
ground floor plan (scale approx 1:1000)



3



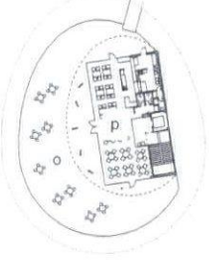
workshop: basement plan



ground floor plan (scale approx 1: 1000)



first floor plan



second floor plan

a gallery
b exhibition hall
c museum shop
d entrance lobby
e planting
f green space
g café
h stage
i meeting room
j office
k hall
l library
m workshop
n kitchen
o restaurant
p roof terrace



4

Museum of Fruit, Yamanashi, Japan
Architect
Itsuko Hasegawa

4
The glazed, deformed globe of the greenhouse.
5
Inside the greenhouse is a lush profusion of fruit trees and plants.
6
The workshop building is engulfed by a steel lattice.
7
Restaurant on the upper level of the workshop, with views of the surrounding landscape through the enclosing lattice.

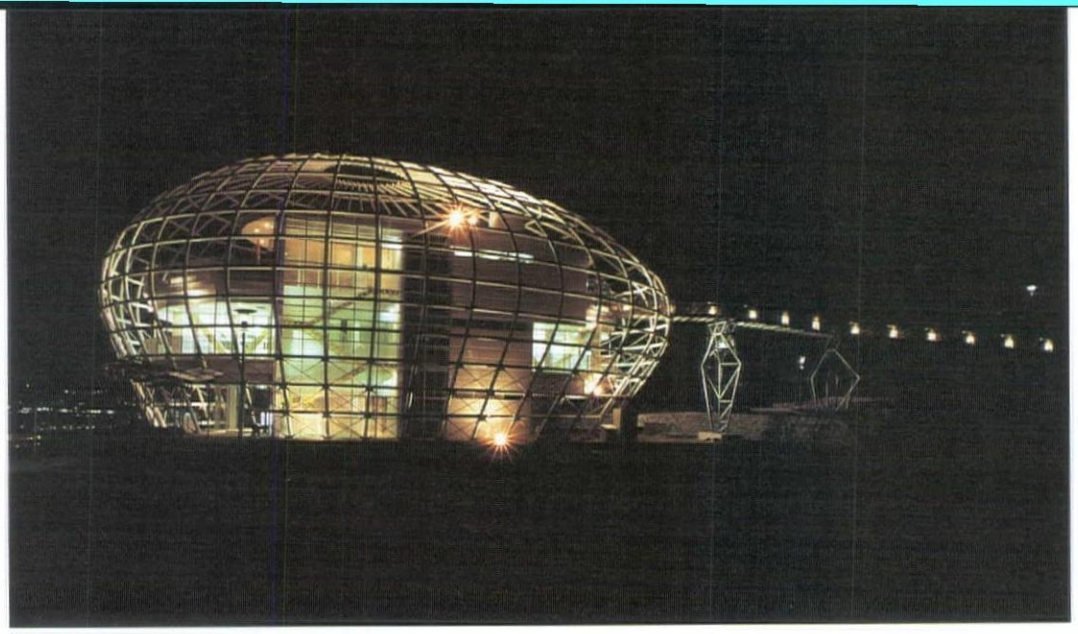


5

interpreted as a metaphor for the vitality and diversity of fruit; a primordial landscape hidden deep in the human psyche. More specifically, the three main steel shell dome structures (housing a tropical greenhouse, event space and workshop), represent the organic shapes of different kinds of seeds dropped on the ground.

The main greenhouse building is a glazed, deformed globe, around 20 m high, containing a lush array of tropical fruit trees and plants. This space age conservatory represents the final mature imagé of the fruit seeds, but is also the beginning of a new cycle of life. The event space is a saucer-shaped glass dome, supported by steel members radiating fluidly out from a central core. Within this low slung structure is a raised stage for lectures and performances, surrounded by indoor flower beds. There is also a small cafeteria. From the light-filled event space, curving ramps and a lift lead down to the subterranean exhibition hall, containing a display of fruit genes, and a gallery. The exhibition space is linked vertically, in turn, with the globular greenhouse.

The third component of the complex is a multi-storey workshop, a transparent rectilinear building encased in a lopsided, egg-shaped steel lattice. The lattice acts as a pergola, which will eventually be colonised by fruit bearing lianas. Workshops and offices occupy the lower levels, with a roof terrace and restaurant above. Both functionally and morphologically, the building contrasts with the other two structures, symbolising the 'foreignness' inherent in the vitality and continuity of nature.



Architect
Itsuko Hasegawa, Tokyo
Structural engineer
Ove Arup & Partners, Japan
Services engineer
Setsubi Giken
Water garden engineer
Shigenobu Hattori Design Office

6



7

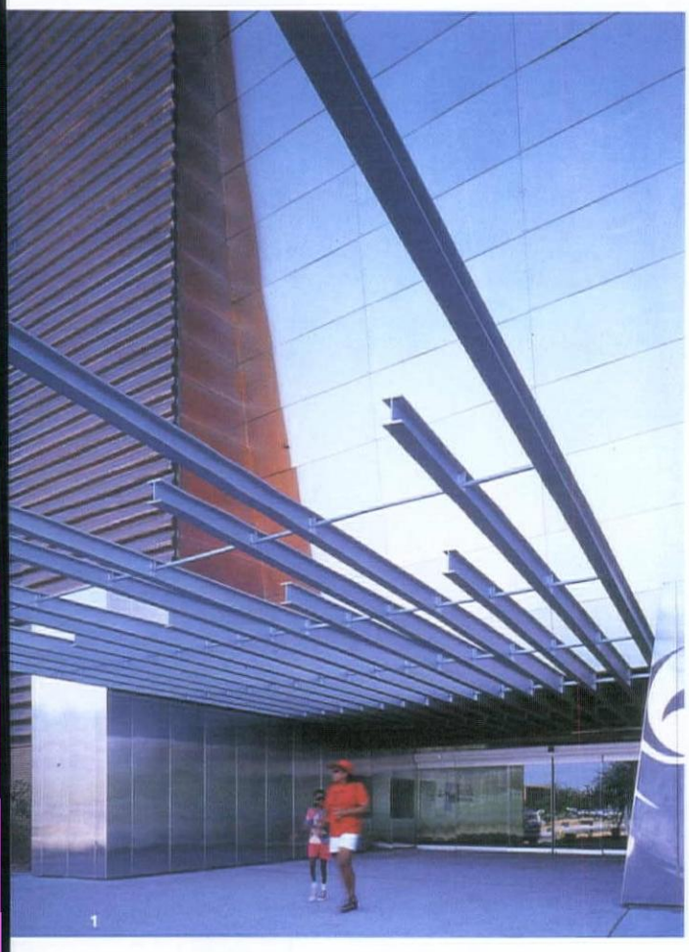
Externally, the buildings are linked by paths which are partially sheltered by jaunty contraptions of lightweight perforated mesh, something of a Hasegawa signature (AR September 1995). The surrounding landscape is dotted with pools and parasols, made from the same light diffusing mesh. At night, the, entire complex glows with a strange intensity, like a coven of alien spacecraft.

The geometry of the three structures was developed through the manipulation of computerised three-dimensional data. Each shape was created through the rotation of simple bodies into complex volumes. The resulting data was converted into two-dimensional drawings. In Japan, new buildings must be able to withstand quite high degrees of seismic loading, so each structure was investigated for strength, eccentricity, stability against snap-through buckling and for controlling movements to limit glass breakage in an earthquake. Additional studies used newly developed analytical tools to illustrate the reserves of post-yield strength before overall shell buckling occurs.

Hasegawa's approach is an expressive synthesis of technology and nature. From a distance, the museum resembles three drops of water, resting lightly on the sloping hillside. Yet the shapes of the three buildings are not perfectly Euclidean, their sensuous deformities reflecting the influence of such natural forces as gravity and wind. Instead of seeing technology and nature as antagonists, Hasegawa sees them as reciprocal entities. At Yamanashi, this reciprocity is the starting point for extraordinary architecture. PHOEBE CHOW

SCARPA IN THE SOUTH-WEST

This very large library has been built on a relatively low budget, but command of modern technology and understanding of the latest developments in engineering theory allow magic to be made.



1
The cantilevered universal beams which act as a virtual canopy, signalling entrance and drawing people into the heart of the building.
2
The great south wall in the evening with the louvres in horizontal position.
3
The sail-covered north wall from motorway. Sails, and projection of saddlebags shade wall from direct sunlight at certain times of the year.
4,5
The huge service saddlebags clad in perforated corrugated copper flank the main volume, and are slashed through by a mirror-like stainless steel panel that sometimes seems to let the sky through the building.

Like Antoine Predock (AR February 1996 p64), Will Bruder has a talent for making buildings that work well when seen from motorways, as well as by people who approach them on foot. And, like Predock, he is not afraid of translating the great and mighty forms of the natural landscape of the American South-West into his buildings. His Phoenix central library (designed with DWL Architects) takes, he says, at least part of its inspiration from the mesas of Monument Valley. Though it is set in the middle of the city on Central Avenue, its shape does, close up, almost seem to rival those of the (much more pointy) mountains that can be seen all round on the fringe of the plain.

That the library has such presence is largely due to its bulk. Fundamentally, the building is a five-storey sealed box with very large floor-plates (90 m x 60 m); it is big, but is saved from being a monolith by dextrous manipulation of the basic box and its surfaces. To east and west of the basically rectangular floor are thin service zones that have outer walls curved in plan and which project beyond the plane of the north wall to help shade its glass face; the walls of these zones are clad in copper sheets, both flat and corrugated. Bruder calls the resulting smooth brown curved forms that flank the body of the building 'saddlebags'.

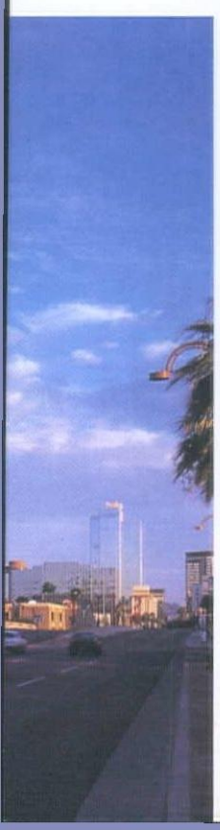
Yet the consciously atavistic terminology and choice of models, which project a kind of South-West, homely cheerfulness onto the building, cannot conceal an acute architectural intelligence at work. Bruder, who did not



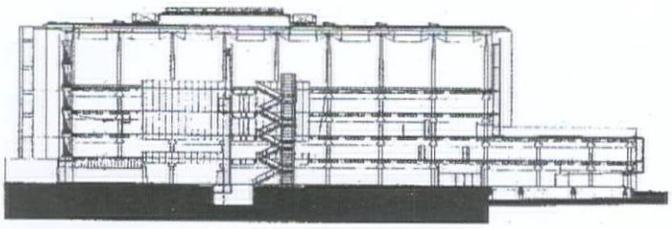




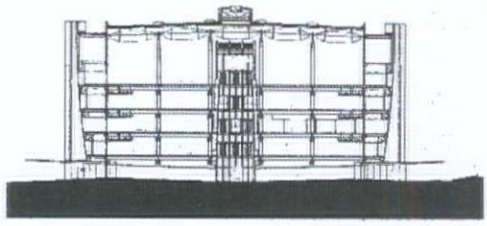
Central library, Phoenix, Arizona, USA
Architect
bruderDWLarchitects
Engineer
Ove Arup & Partners



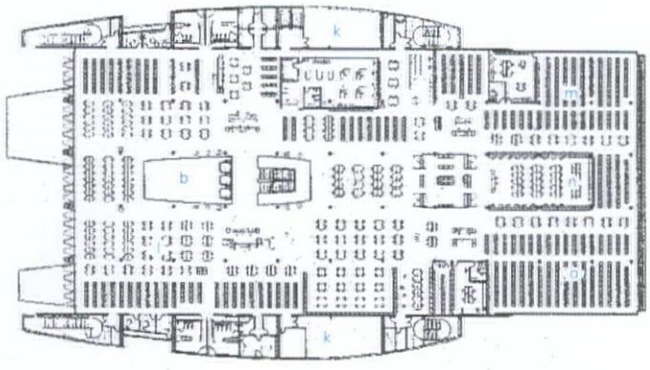
a entrance
b crystal canyon
c restaurant
d auditorium
e check-in
f check-out
g fiction
h biography
j children's library
k duct in saddlebag
l reference
m government documents
n microfiche
o periodicals
p technical services
q administration
r librarians
s closed stacks
t music collection
u Arizona collection
v non-fiction



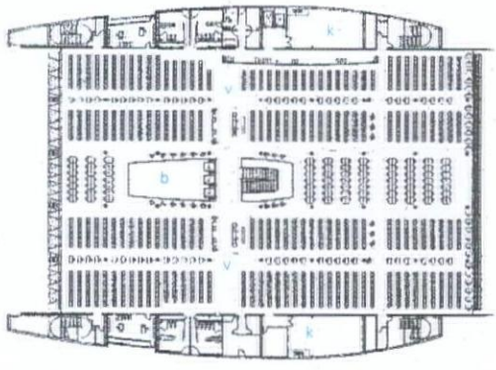
north-south section



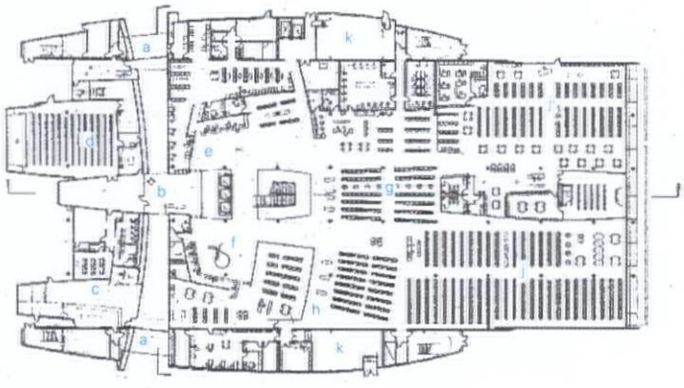
east-west section



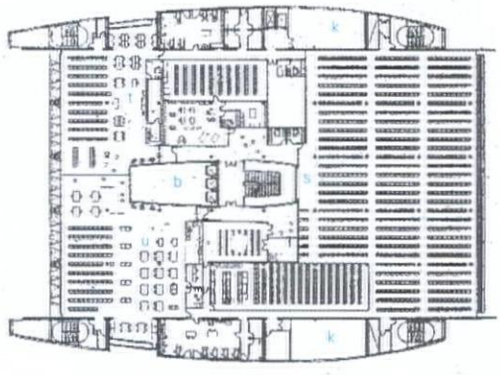
first floor



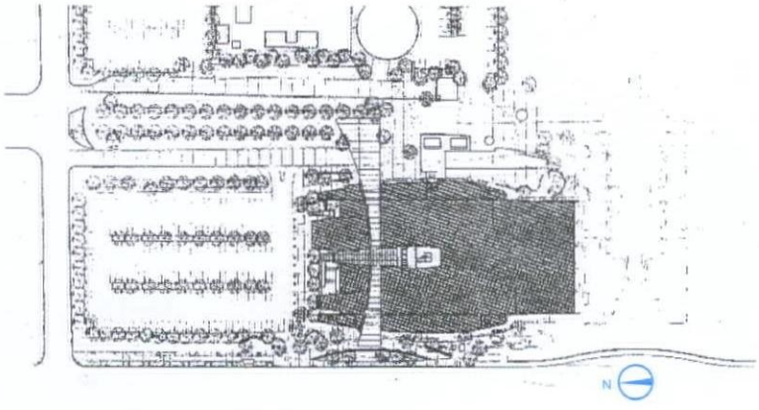
fourth floor



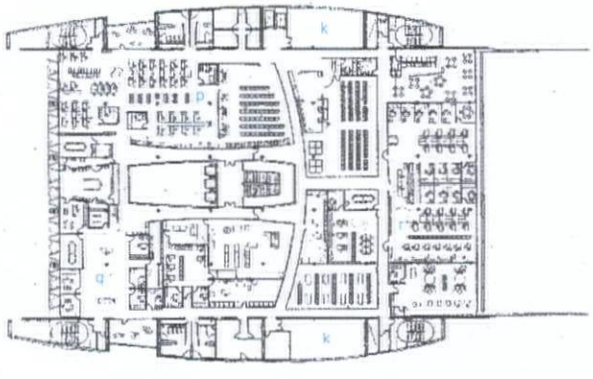
ground floor (scale approx 1:1400)



third floor



site plan



second floor

Central library, Phoenix, Arizona, USA
Architect
bruderDWLarchitects
Engineer
Ove Arup & Partners

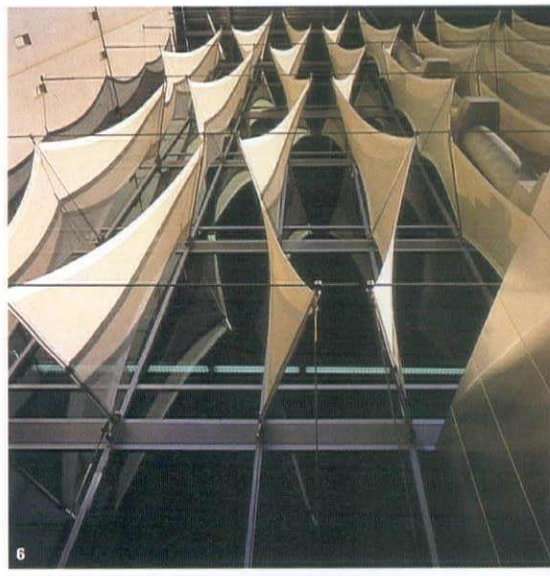
attend architecture school, became an architect in the old-fashioned way, almost by apprenticeship, as he worked for a succession of distinguished architects and befriended others including Paolo Soleri and Bruce Goff. Perhaps as a result, his sensibility is much more honed to appreciation of the tectonic qualities of architecture than many of his contemporary countrymen. Looking at his work, it comes as no surprise to learn that he became a devotee of Carlo Scarpa during a period as a Fellow of the American Academy in Rome in 1987.

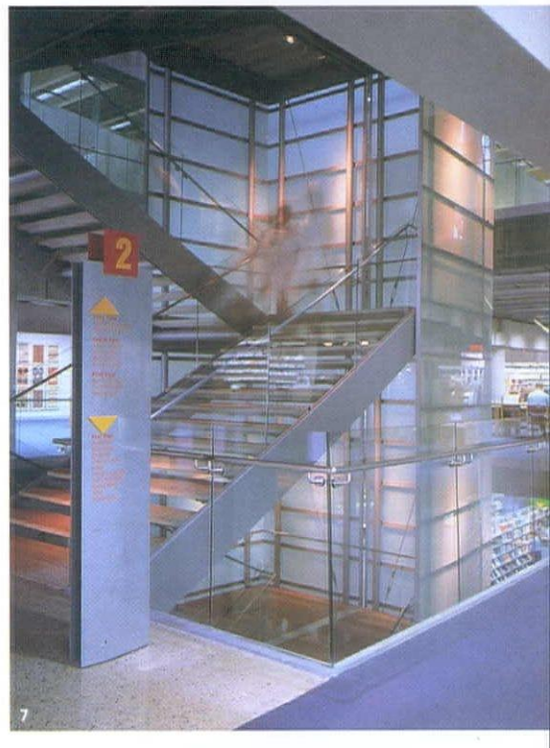
But unlike Scarpa, whose devotion to craftsmanship is legendary, Bruder has to work within the rigorous constraints of the (very efficient) industrialised US building industry – particularly in the Phoenix library, which is his biggest building to date, but one that has had to be realised on quite a restricted budget. Externally, the tectonic sensibility is to be seen in the copper walls of the saddlebags, which are perforated with regular holes so that at night the inner life of the building is seen in shadow-play. In daytime, it becomes clear that the saddlebags are slashed by smooth polished steel panels that rise from above the entrances to roof level. These curve slightly inwards over the entrance canopies, emphasising that they are metaphors for the girths, or whatever the straps are called that attach saddlebags to the horse. But the polished steel panels do more than merely call attention to the equestrian aspects of the design; in certain lights, they act as mirrors for the sky, so the brown cliffs suddenly seem to have been miraculously chopped through by a wide canyon.

The entrances themselves have canopies, or rather virtual canopies, made of white-painted universal steel beams which project horizontally from under the curve of the polished metal. Every fourth beam cantilevers far out; its neighbour is a couple of metres shorter, and there is a shorter beam between that and the next long beam. The canopy is a powerful (yet not overpowering) invitation to enter which delicately reaches out against the huge scale of the copper walls, gradually becoming visually more dense and protective as you penetrate towards the interior: Carlo Scarpa has come to the South-West.

But before going in, it is as well to finish looking at the exterior. On the south side, the building projects beyond the saddlebags and is revealed as a rather angular grey unequine entity, whose thin precast concrete walls frame a glass skin which constantly changes, for it is striated with computer controlled adjustable aluminium louvres that move according to the sun to prevent the interior from becoming over-insolated. The north elevation is contained by the ends of the saddlebags that house escape stairs; the projections gradually peel back the copper to reveal the precast concrete of the inner walls – another Scarpa-like touch. The glass wall is not only shaded by the projecting saddlebags but by vertical sails (designed with FTL/Happold) of teflon-coated acrylic fabric. Their profiles are calculated to provide shading for the interior against direct sunlight between spring and autumn without obscuring magnificent views of the mountains above the predominantly low-rise city. The sails are kept in shape by ropes in sleeves at their outer edges: the ropes are tensioned against struts that convey the sails' loads back to the main structure. It is surprising that Bruder has not come up with a homely South-Western metaphor for the frilly-knicker effect of the sails against the glass.

You enter the building along a curved route from the porches which delivers you past the lecture theatre or the restaurant (according to where you came in) to the central lobby which is the base of an atrium – Bruder calls it the 'crystal canyon' – which runs up through frameless glass walls to rooflights. (These have mirrored louvres that are computer controlled to move to reflect sunlight into the big void underneath – a rather more successful suncatching contraption than Foster's in the Hongkong and Shanghai Bank, AR April 1986). Through the glass walls of the atrium, the main structure of the building can be seen clearly. It is very similar to normal multi-storey warehouse construction, with precast columns carrying precast beams that themselves support precast floor units. To east and west, precast concrete walls act with the diagonally braced steel structures of the saddlebags to stiffen the whole structure. (The concrete walls also act as thermal fly-wheels, absorbing heat during the day and emitting it in the cool of the night.) Apart from the crystal canyon, the spaces contained by the precast structure are, as you might expect, rather run-of-the mill – except where they offer splendid views through the great north and south glass walls. On the ground floor, there are the fiction and video lending departments and the children's library. The first floor contains the reference library, and departments for periodicals and government; the second floor houses the administration;





6
Stiff frilly sails shade north wall but allow views of city and mountains.
7
Staircase in its glass well.

the third special collections. And on the top floor is the great reading room – the main non-fiction area.

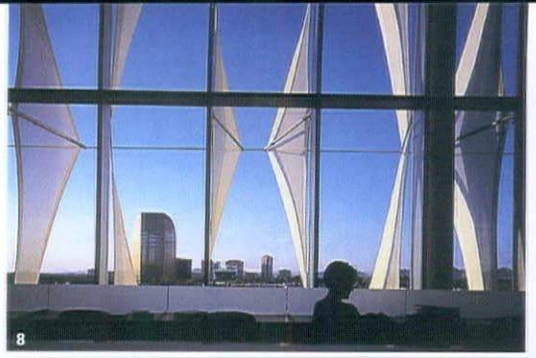
Here, the trabeated structural discipline of the lower floors is abandoned. Strange tapering precast columns stop short of the curved roof but are plainly supporting it. The trick is pulled by propping the purlins of the galvanised corrugated roof deck on stainless-steel struts that are themselves supported by stainless-steel cables which are stretched from the column heads. The arrangement translates the downwards (and upwards) thrusts of the roof through the struts to tensile stresses in the cables which are transferred to mainly compressive stresses in the columns through the cruciform stainless column heads.[1] (It would be wrong to call them capitals, for they do not provide a visually satisfactory capping effect.) Instead, the columns are more like a grove of masts or tentpoles which, with the rigging up under the curve, give a vague impression of transience, of setting out on a journey, appropriate perhaps for a space devoted to the exploration of knowledge.[2]

The feeling of embarkation and transience is amplified by the daylighting. A slot of rooflights against the side walls stresses the hovering, unconnected quality of the metal curve, while emphasising the noble, striated smoothness of the precast concrete. In the roof deck above each mast is a 2 m diameter rooflight which is glazed with blue laminated glass, in the middle of which a 400 mm hole is left clear, so that at the summer solstice sunlight shoots straight down to anoint the masts of knowledge, which are of course also partly symbols of other more human and animal things. In so doing, the light evokes ideas that relate us to an immemorial past.

By ingenious use of technology and new methods of structural analysis, Bruder and his engineer (Michael Ishler of Ove Arup & Partners Los Angeles) have made a place that has several dimensions of magic on a relatively low budget and within a system of procuring and making big buildings that so often marginalises architecture to external decoration. MARGARET SEAL

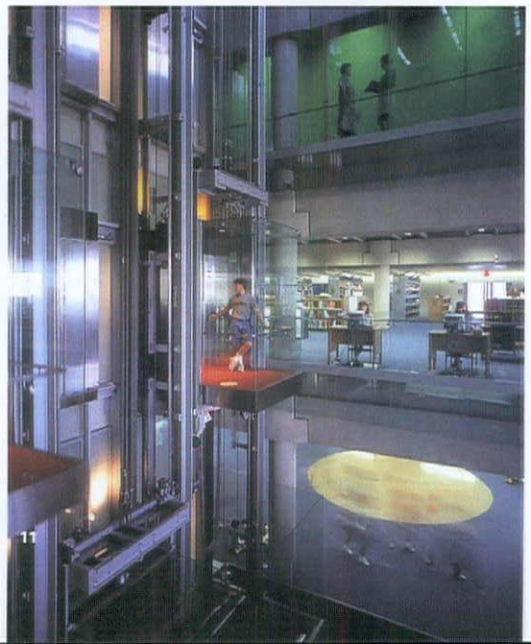
1 The cables penetrate the concrete side walls (which take vertical loads only) through holes to connect with the bracing steel frames of the saddlebags, which must take a good deal of the lateral stresses.
2 The space lit from the ends and with a central reading area has points in common with Bruder's much smaller branch library at Cholla, Phoenix (AR July 1992, p46-51).

Architect
bruderDWLarchitects, New River, Arizona; a joint venture between William P. Bruder and DWL Architects & Planners: Will Bruder, Wendell Burnette, Carleton Van Deman, Bob Adams, Marc Arnold, Lito Aquino, Maryann Bloomfield, John Chopas, Lauren Clark, Mark Dee, Beau Dromiack, Dan Filuk, Michael Haake, Frank Henry, Toni Ann Hindley, Sharon Kraus, Rick Joy, James Lindlan, Dean Olsen, Peter Pascu, Vicky Ramella, Jeff Wagner
Landscape architect
Martino & Tatasciore
Engineers
Ove Arup & Partners, Los Angeles (structural/acoustic/building systems): Rob Bolin, Peter Budd, Richard Bussell, Jacob Chan, Donna Clandening, Nancy Hamilton, Richard Hough, Michael Ishler, Alan Locke, Dan Ursca
Bates/Valentino Associates (building systems)
Hook Engineering (civil)
Consultants
Mason Associates, Professional Library Consultants (library)
Lighting Dynamics (lighting)
Tait Solar Company (daylighting)
Construction Consultants Southwest (cost)
FTL/Happold (structural fabric)
Photographer
Bill Timmerman


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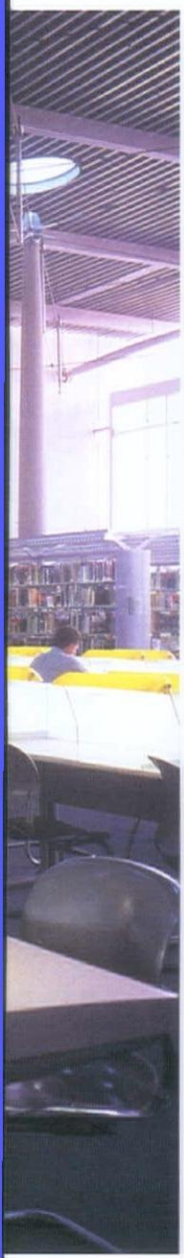

9


10


11

8
Looking out through the sails.
9
Roof of reading room is supported by rigging attached to columns which are anointed by light from above.
10
Slots of light at edge of roof emphasise its hovering quality.
11
Trabeated precast construction of intermediate floors seen from crystal canyon.
12
Crystal canyon runs up to roof lights and contains glass lifts which climb its north wall.

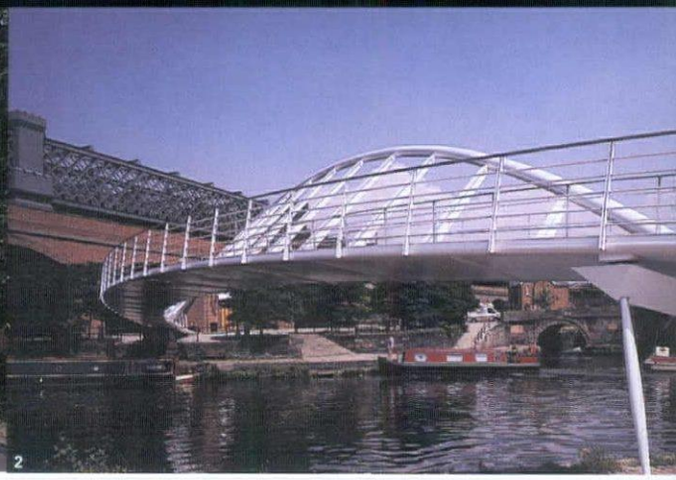
Central library, Phoenix, Arizona, USA
Architect
bruderDWLarchitects
Engineer
Ove Arup & Partners





12





Bridge, Manchester, England
Engineer
Whitby and Bird

LIGHT CURVE

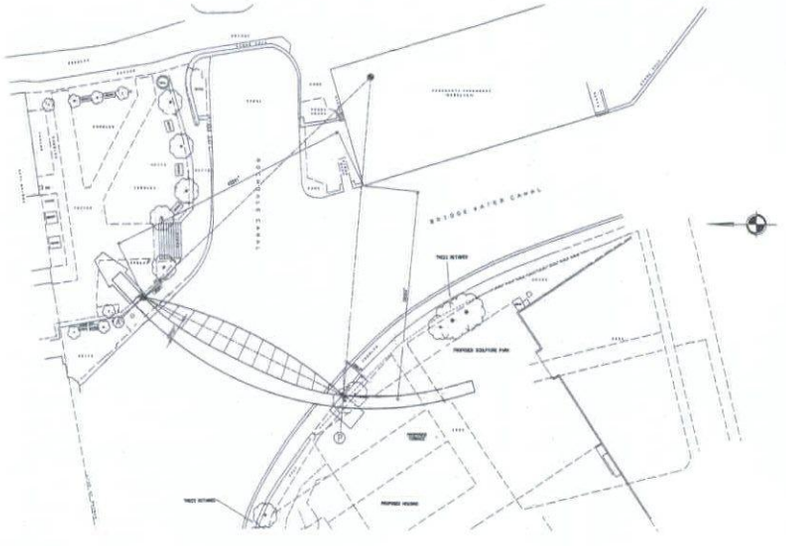
This new bridge in Manchester harnesses two mutually compatible structural systems to great expressive effect.

Merchants Bridge, in Manchester, was the outcome of a competition to design a modern pedestrian bridge in the UK's first industrial heritage site. Spanning 38.2 m over the Bridgewater Canal at its junction with the Rochdale Canal, the new structure is set among a series of existing bridges. Fifteen are visible from the new bridge, providing a potted visual history of the engineer's art. Despite being a showpiece project, the budget was comparatively modest and the brief called for full disabled access.

Both these factors influenced the design. The need to incorporate ramps, coupled with strict clearance requirements over the canal, meant that for every 100 mm of depth, the length of the bridge would increase by 4 m. Whitby and Bird's response was to adopt a design that could be achieved with as thin a deck structure as possible, on a curving plan that closely followed existing desire lines of movement. Using the deck as a torsion structure, it was possible to support the bridge from a single arch, which is itself restrained by the deck, so harnessing two mutually compatible structural systems. Inclining the arch away from the bridge counterbalances the deck, which curves in the opposite direction to the arch, endowing the entire structure with a dynamic, sculptural quality. Rather than being enclosed within a structural cage, the pervading impression is of being lightly cradled on the fingers of an upturned hand.

The support on the west side of the canal is, to some extent, an engineering indulgence; what is actually required is a vertical support under the arch. However, concern to extend visually the form of the arch inspired the resultant modification to a steel cantilever. The base of this returns below the arch, indicating the course of the structural forces involved. In effect, the resulting slender steel prop carries the larger proportion of the vertical load and limits deflection in the cantilever arm.

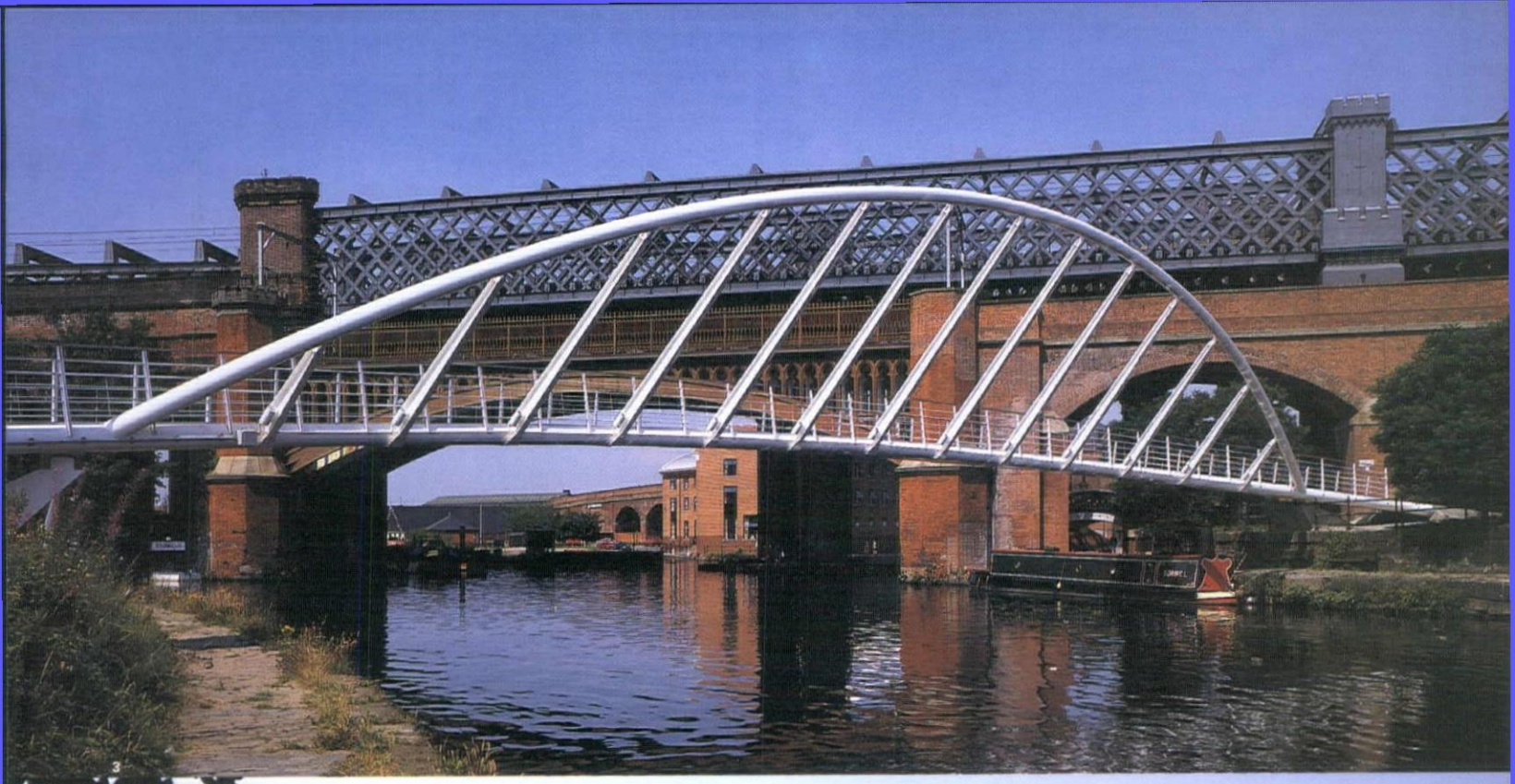
Handrails, which can often account for a large proportion of the cost of a bridge, are here conceived as simple, flat, horizontal bars, set in panels and clipped to the structure. The topmost stainless steel rail is continuous and was welded on site. The bridge is illuminated by uplighters set along each arm, which pick out the arch and define the route, enhancing the overall sense of lightness and movement. C.S.



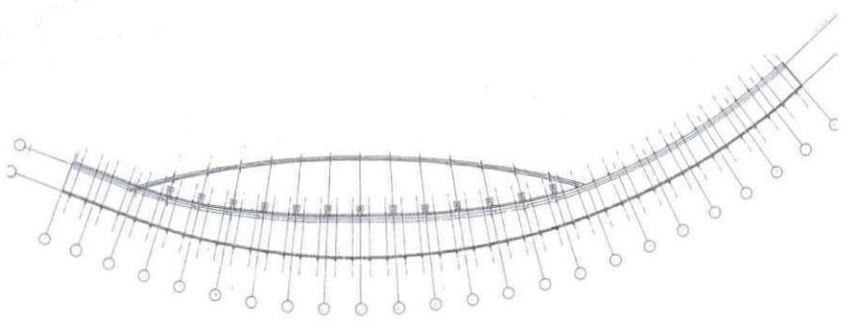
site plan



west elevation







plan (scale approx 1:400)

Engineer
Whitby and Bird, London
Architect
RHWL Architects
Quantity surveyor
Davis Langdon & Everest
Photographs
Morley von Sternberg

1
The new bridge presents an inviting promenade across the Bridgewater Canal.
2
The ramped configuration ensures full disabled access, which was one of the stipulations of the brief.
3
The graceful, inclined arch restrains and counterbalances the curving bridge deck.
4
The horizontal handrail is set in panels and clipped to the structure; only the top rail is continuous, welded together on site.



1

TIMBER CONNECTION

A bridge exploits the qualities of laminated wood to form a frame for the landscape and a gate for the town.

The little bridge over the river Mur at Murau in Styria is set just at the moment where the river emerges past the medieval town into open countryside. So it was conceived as a frame for views in both directions. Functionally, it connects the level of the old town with that of the riverside walk below and with the station higher up the valley side. (The latter is reached up flights of steps that, inside their box structure, make a free-flying bridge in itself, but here, we are mainly concerned with the river crossing.)

The main bridge is essentially effected by using an enormous Vierendeel beam. Stripped to basics, the structure consists of two booms of laminated timber connected at each end by vertical webs made as hollow boxes with thick ply skins. The bottom boom is prestressed with a 41 wire cable set in a grease-filled plastic tube, enabling it to take more bending; tension is constantly monitored and easily adjustable. The boom bears on concrete abutments at each end; at the town side the concrete is developed to offer steps down to the river walk, and on the station side, connection is made to the ramp on the flank of the valley.

Both top and bottom booms are stiffened into T shapes with 200 mm laminated timber flanges and these horizontal planes support roof and footway decks. Both are made in simple carpentry fashion by cantilevering joists out on each side at right angles to the axis of the bridge. At footway level, the joists are covered in 50 mm tongue and grooved rough sawn pine planks to take the traffic. The ends of the joists carry uprights which are clad outside with larch planks and on the inner surface with glued butt-jointed pine boards; the handrail is of laminated larch. A more-or-less conventional roof structure is built up on the joists of the upper deck to carry a stainless steel covering. (Water on the footway is disposed of down slots between the 200 mm boards and the parapet and the lower boom is protected from wet coming from above by a damp-proof membrane.)

The whole effect is splendidly solid, like walking along a slot carved by a constructivist giant out of a huge bolt of timber. The wonderful smell of wood mingles with the clean drift of the dark river and the earthy scents of the bank. The bridge is a reminder that the great Germanic tradition of building covered timber bridges as urban gateways is far from dead. E.M.

Bridge, Murau, Styria, Austria

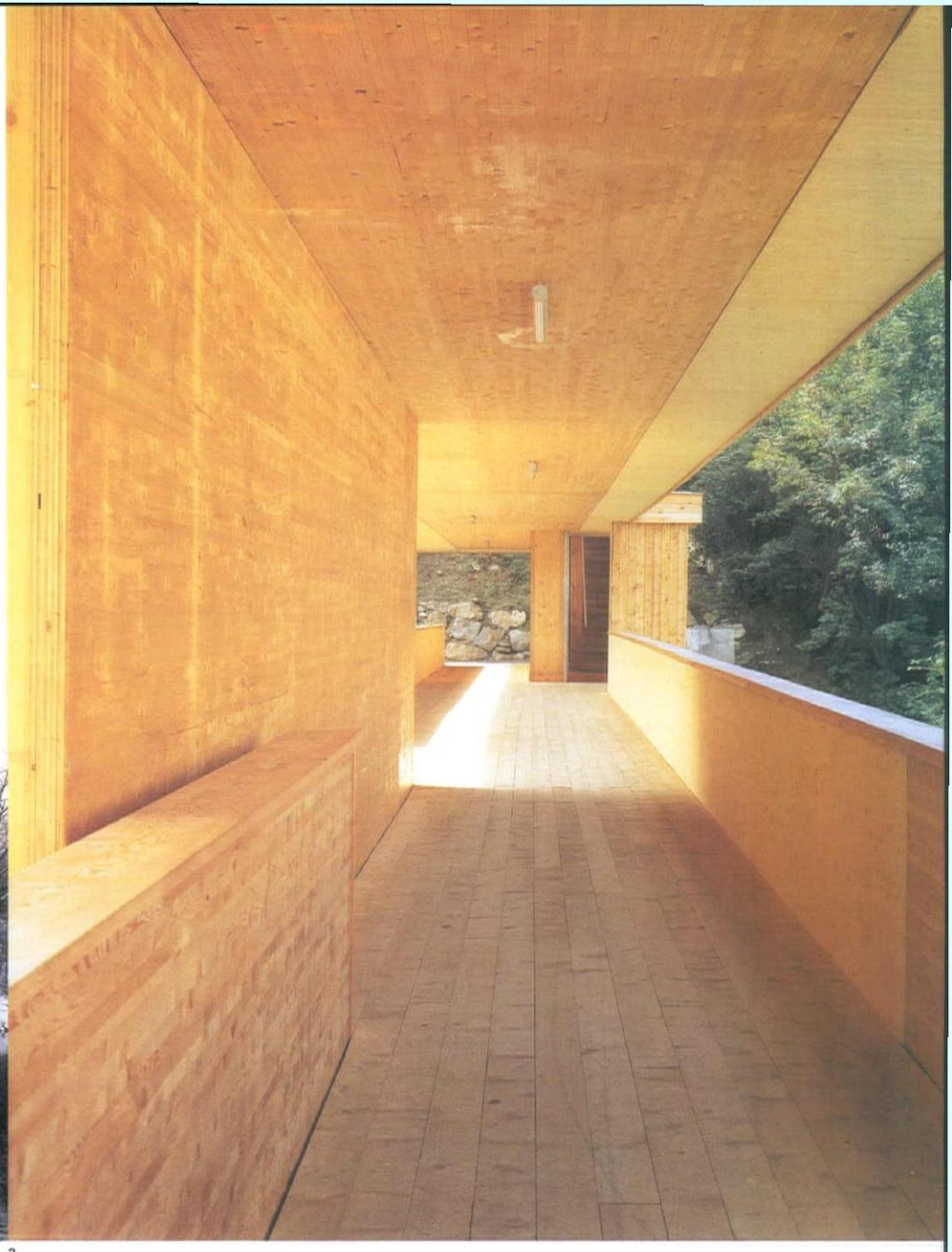
Architects

Marcel Meili, Markus Peter

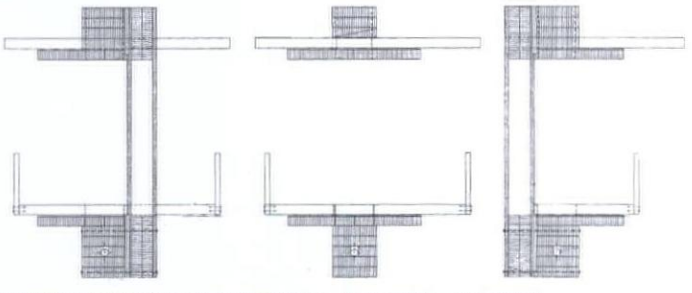
1
Almost as if it has been carved from solid wood – bridge from town end.
2
The stair that carries passengers to and from the station is itself a box bridge in which walls, roof and flights work together as one structure.
3
The path along the bridge is ingeniously joggled round the box webs, the walls of which are made of very thick ply (left).

Architects
Marcel Meili, Markus Peter with Astrid Staufer, Zurich
Engineers
Andrea Branger, Jürg Conzett, Chur
Wooden construction
Kaufmann Holzbauwerk, Reuthe; engineer Stefan Kraus
Photographs
Heinrich Helfenstein

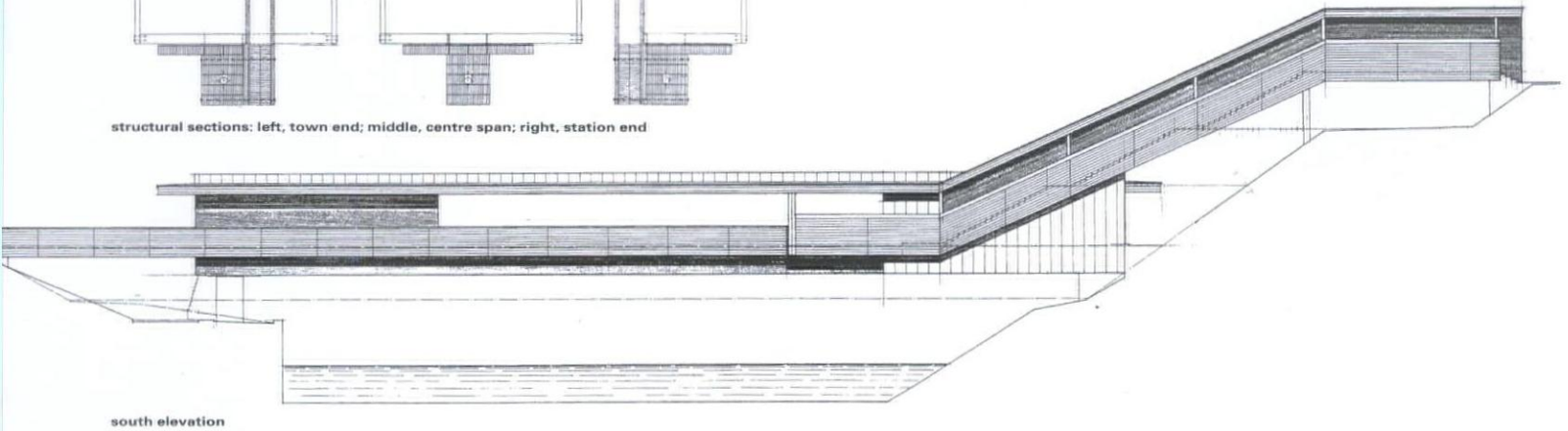




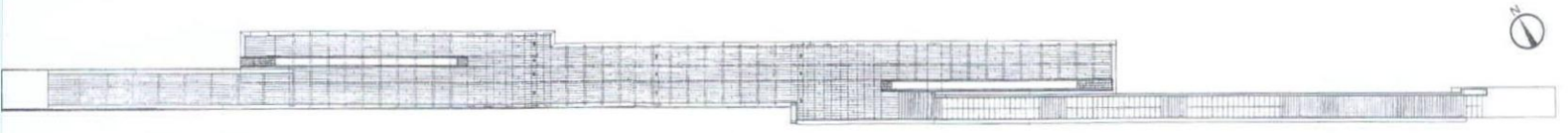
2 3



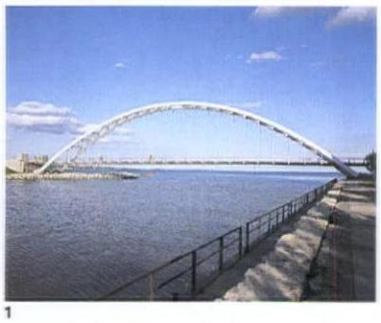
structural sections: left, town end; middle, centre span; right, station end



south elevation



plan at deck level (scale approx 1:400)



1

THUNDERBIRDS ARE GO

This pedestrian bridge at the point where the Humber River flows into Lake Ontario is designed to have heraldic character as both landmark and gateway.

The Humber Bridges Project not only creates a new entrance into the City of Toronto but also marks the point where the Humber River enters Lake Ontario. The project consists of a series of bridges for both vehicular and pedestrian traffic but it is in the design of the new bridge for pedestrians and cyclists that this concept of a double gateway is most clearly expressed.

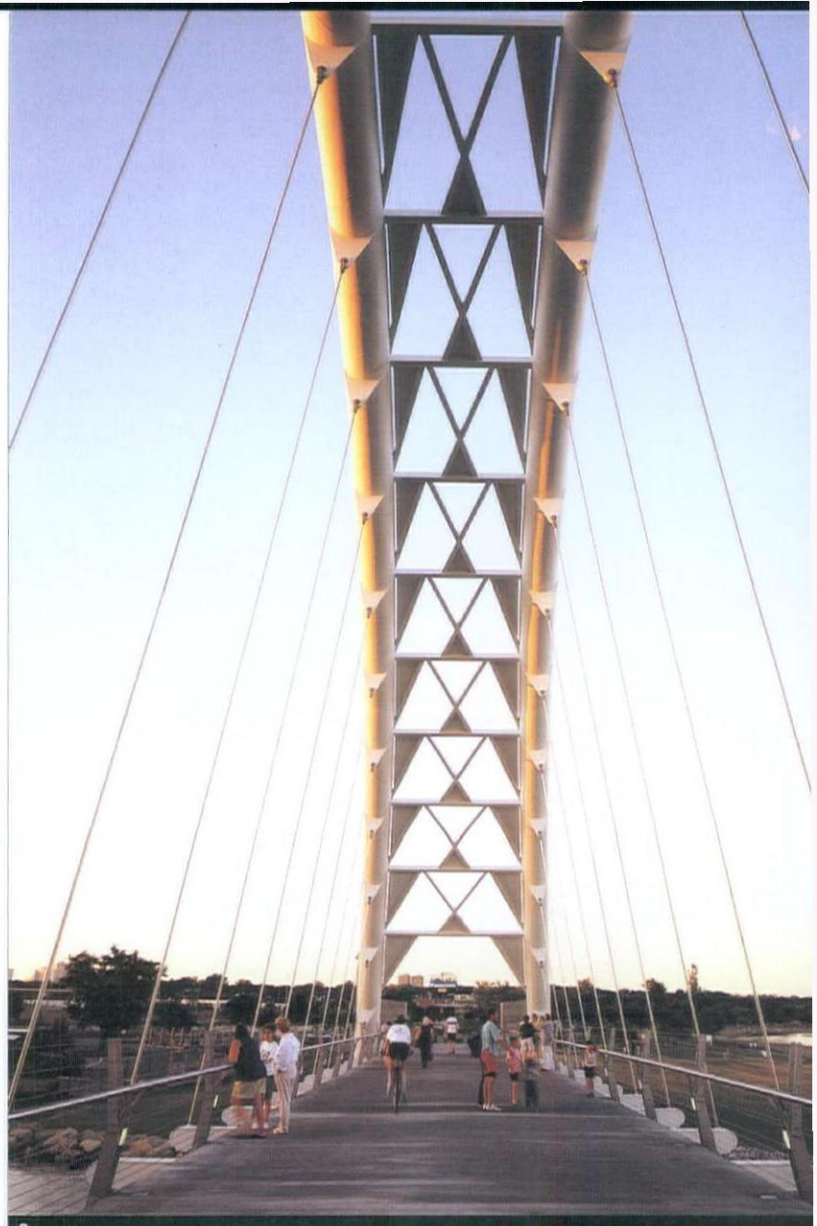
This bridge, which provides a link in a pathway system along the lake shore, has a clear span of 100 metres. Designed as a steel tubular tied arch structure with in-situ concrete abutments and thrust blocks at either end it supports steel beams and a 6.5 m wide concrete deck with stainless steel hanger rods. And while the white painted arch clearly marks the mouth of the river when viewed from the lake, the two connected arches have been designed to flag the sequence of entry and the movement of people across the bridge.

Perhaps as a consequence of these two contrasting views of the bridge it has not been designed with a particular pre-occupation of lightness. The arch is substantial – two curving ribs each made up of a 1.22 m diameter steel tube, which are tied by a series of RHS steel tubes fixed with brackets of steel plate creating a structure of a scale commensurate with the broad expanse of Lake Ontario and the long sweep of the lake shore. Yet in its detail at the deck and handrail, the project demonstrates a fineness which is scaled to the human body as well.

The design has also been influenced by the historic significance of this particular site. Its location, the site of an aboriginal settlement and 'carrying place' where the long portage from Lake Ontario north to Georgian Bay began, encouraged the client to establish a multi-disciplinary design team. Architects, engineers, landscape architects and artists were brought together to develop an overall plan for the project as well as collaborating on the detailed design of the site and the bridges. So the form of the ties on this pedestrian bridge makes reference to the Thunderbird – ruler of all airborne species and an icon of the Eastern Woodland First Peoples who formerly occupied the site – while the abutments have been oversized and shaped to suggest totemic guardians and the monumental cairns traditionally used as wayfinders in the landscape.

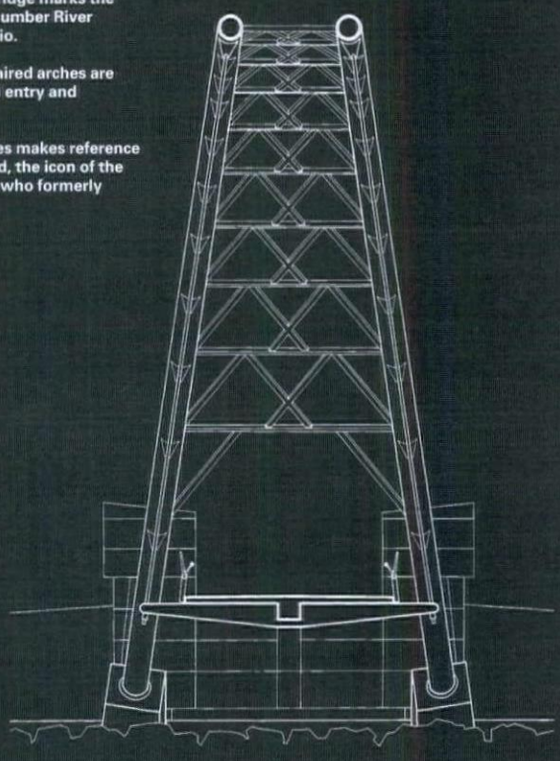
The new Humber Bridge marks a concern for and a commitment to a thoughtful and inspired sense of design in the creation of new public infrastructure – an essential part of building a civilised country. BRIAN CARTER

Architects
Montgomery & Sisam Architects, Toronto: Terry Montgomery, David Sisam, Robert Davies, Santiago Kunzle, David Lee (drawings)
Engineers
Delcan Corporation
Landscape Architects
Ferris + Quinn Associates
Photographs
Robert Burley/Design Archive



2

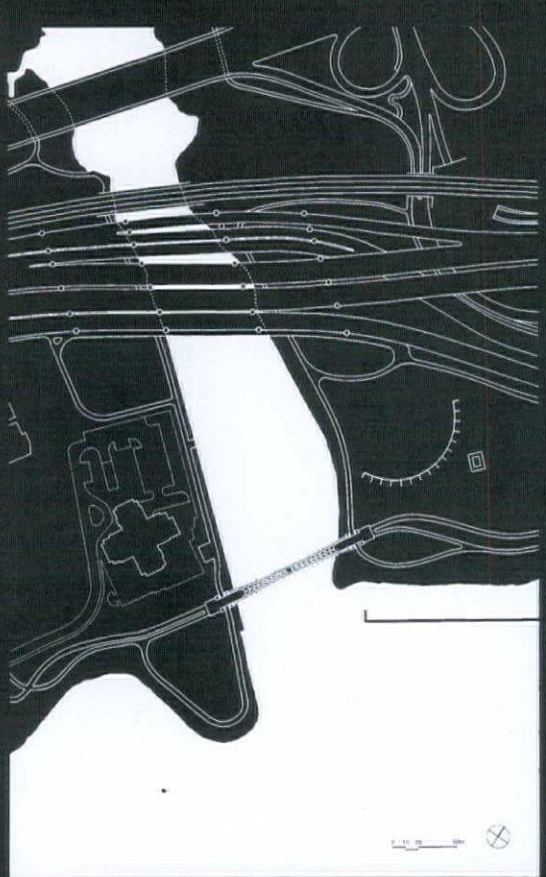
1
The 100 m span bridge marks the point where the Humber River enters Lake Ontario.
2
The substantial paired arches are intended to signal entry and movement.
3
The form of the ties makes reference to the Thunderbird, the icon of the aboriginal people who formerly occupied the site.



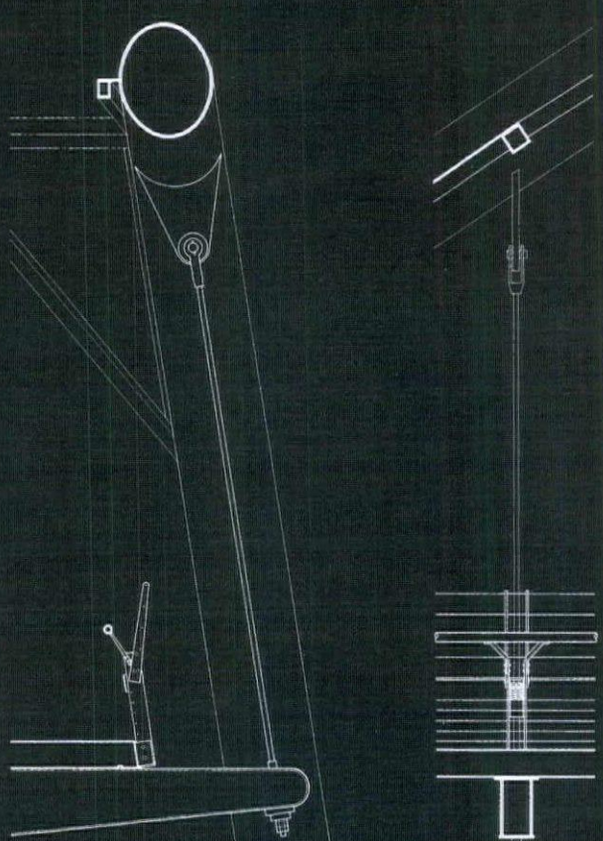
cross section (scale approx 1:350)

Bicycle pedestrian bridge, Humber Bridges Project, Toronto, Canada
Architect
Montgomery & Sisam Architects

3



site plan (scale approx 1:5500)



details of deck support and handrail (scale 1:100)

LANDMARK LINK

Bridge, Salford, England
Architect
Santiago Calatrava

A dramatic new cable stay bridge in Salford is more than a simple physical link – it forges together two rival cities and acts as a fulcrum in the area's regeneration plans.

Trinity Bridge was inaugurated in September last year. It spans the 36 m wide River Irwell linking the underused Chapel Wharf area of Salford with a lively edge of Manchester's business district off Deansgate.

The new bridge represents a move away from the bent tube structures and concrete support design that have preoccupied Santiago Calatrava in recent years. Instead, it concentrates on an exploration of lightweight materials and the aesthetics of structural and visual tension. As the design developed, Calatrava drew inspiration from the linear sculptural constructions of Naum Gabo and the spatial experiments of Antoine Pevsner. The result, however, is unlike the finished work of either of these sculptors in terms of scale or in the way it solves – with an efficient and economic symmetrical plan shape – the need to create a new landmark in a drab environment, and a simple crossing.

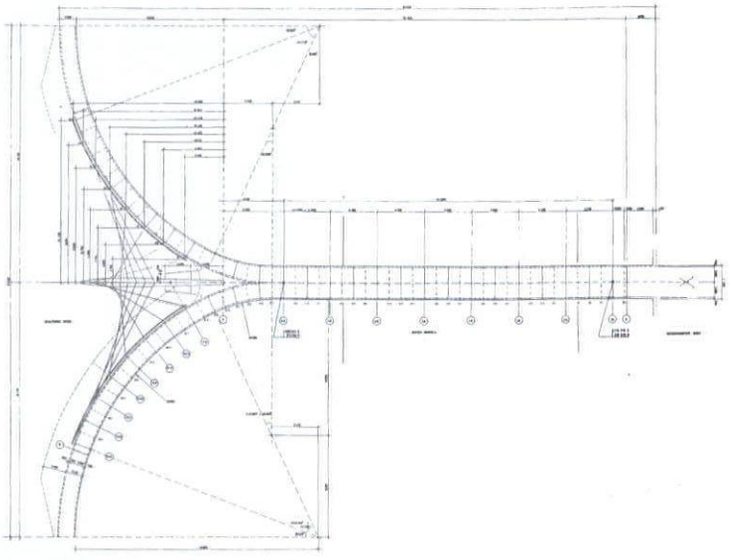
Linking a large redevelopment site on the Salford side, the bridge connects a new car parking area to the edge of Manchester's thriving business district. Along with local initiatives in both cities, Salford is providing a focus for the potential regeneration of a completely unexploited inner city area.

The cable stay bridge design was chosen (a simpler box girder based alternative scheme omitted the pylon and cable stays) because of its symbolic potential. Shot through with complex tensions, the concept is built up three dimensionally into a fecund design which allows the long stalk-like plan shape of the curved stressed deck to land sensitively on the Manchester bank, like a visitor from another planet. Indeed, at one moment in its design there was some discussion about the possibility of the narrower end of the bridge just hovering 100 mm above the bank on the Manchester side. This cleavage would have allowed the whole structure to have a sense of movement, freed from the rigid connections demanded by current design regulations.

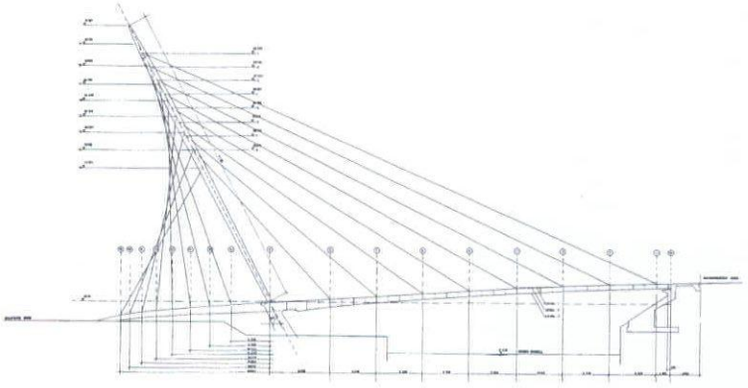
The bridge springs from the Salford side of the river reaching over towards Deansgate from its tall, sloping and highly visible white painted steel pylon, 37 m high. The total length of the bridge is 67 m long. The minimum width at the Manchester end is 6 m and on the Salford side approximately 11 m. The huge white painted steel pylon, which rises from an *in situ* concrete base containing a short staircase, holds the subtly curved spanning bridge deck (which is pitched at 1:18) and the spiralling entry ramps by means of taut stainless steel cable stays, giving the whole spectacular design its tense, dynamic sculptural profile.

The concrete abutments and foundations on either side of the river were also cast on site. The ramps connect with the abutments which have moveable supports in the direction of the main span axis. The deck, which is made from an independent torsionally stiffened hollow box girder beam, was lifted on site from the Salford side in three main sections. The deck and pylon were manufactured in Bilbao, Spain and assembled on site. The stainless steel stays were positioned and post-tensioned on completion by the main contractor after final computer verification of lengths.

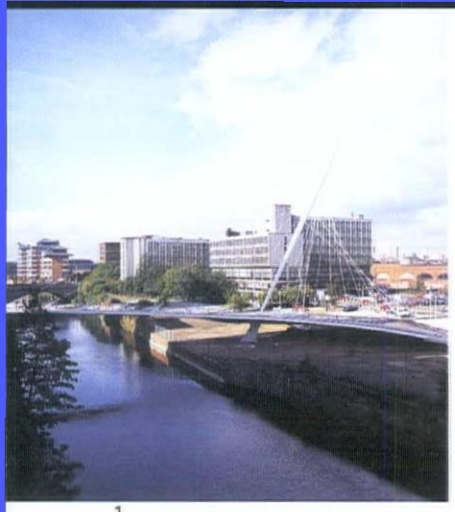
For Calatrava, bridges always have a special influence on local environments. Not merely utilitarian objects set in the urban scene, they have a power to heal past disputes and provide new opportunities. With the Bach de Roda bridge in Barcelona, two distinct communities were brought together. Here, this new bridge is seen as a reconciling link between the rival cities of Salford and Manchester. At night its symbolic mission is further enhanced, when the integral lighting scheme comes into play. The white painted pylon is lit up as well as the underside of the bridge which reflect light onto the river surface. A further stage could see the clean up of the murky Irwell too. DENNIS SHARP



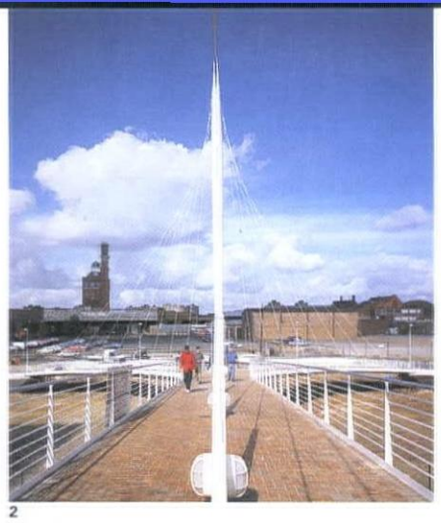
plan (scale approx 1: 1000)



longitudinal section

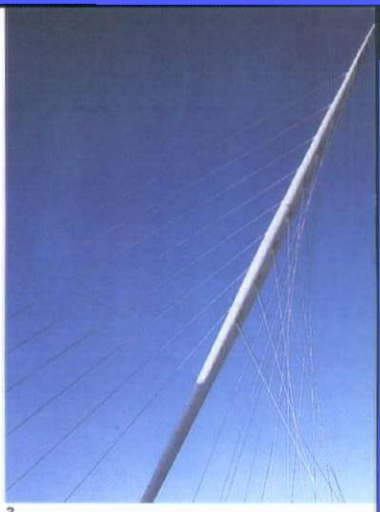


1

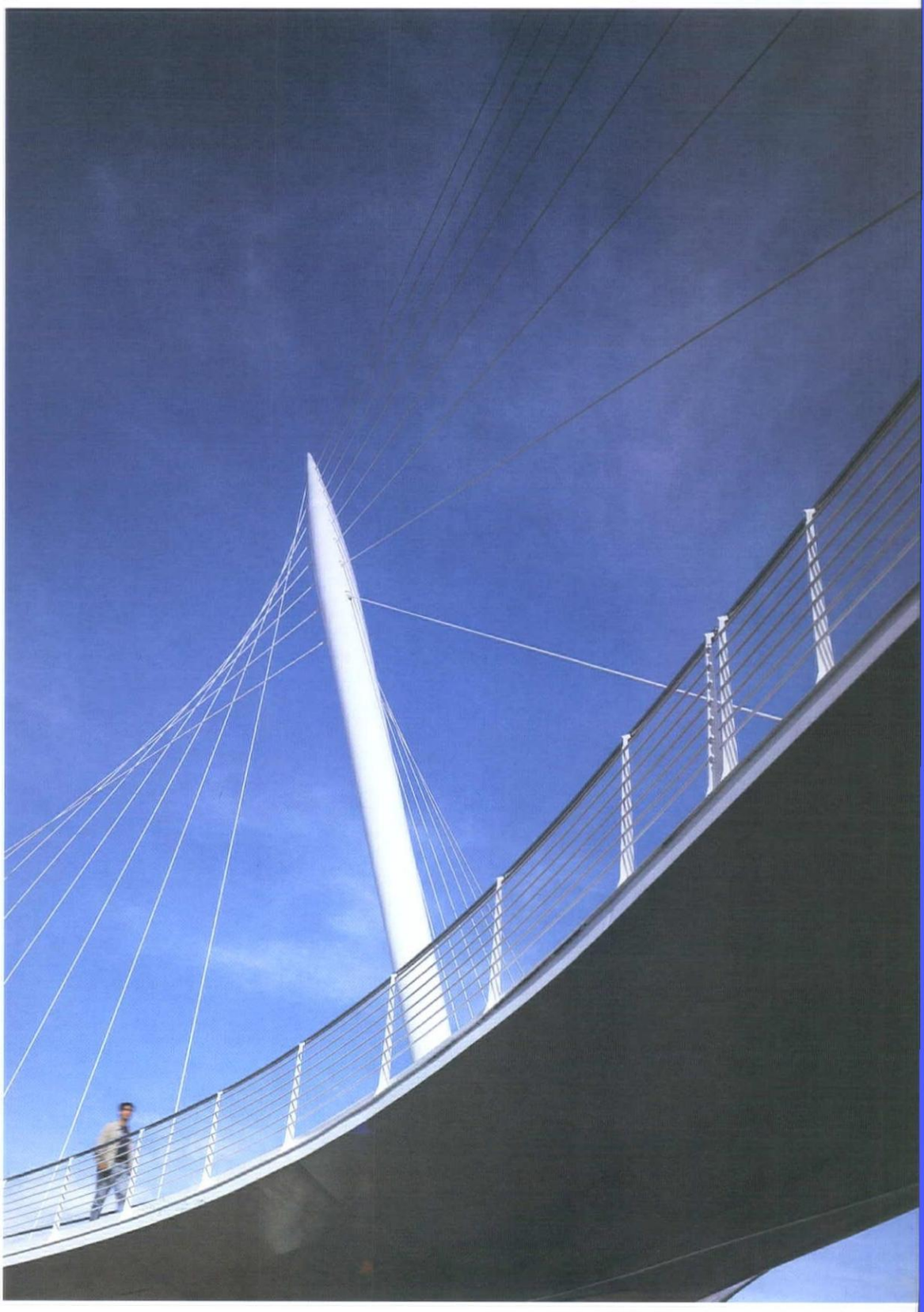


2

1
The new bridge lightly spans the River Irwell.
2
The 67 m span is achieved by a cable stay construction.
3
Detail of pylon and steel cable stays.
4
The sculptural composition of steel and tensile members recalls the work of Naum Gabo.

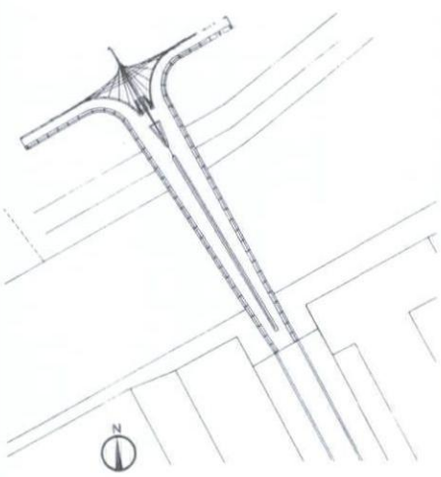


3



4

Architect
Calatrava Valls, Zurich
Project team
Santiago Calatrava, Jose Moro, Peter Luty
Structural engineer
Santiago Calatrava
Consultant engineer
Buro Happold
Supervisory and site engineer
Salford City Technical Services Department
Photographs
John E. Linden



site plan

SPORTING STARS

School sports halls, Keplerstrasse, Graz, Austria
Architect
Volker Giencke
Criticism
Peter Blundell Jones

Two wide-span sports halls are sunk under a new *cour d'honneur* for a large secondary school in Graz. The remarkably slender-looking roof contains several surprises.



1

The astronomer Johann Kepler was born in Graz. The Kepler Grammar School named after him is one of the biggest in the city with about a thousand pupils, built at the turn of the century in the massive neo-Baroque manner typical of that time. It stands on Keplerstrasse, on the right bank of the river Mur and close to the centre, just north of the Schlossberg (see AR October 1995, pp4-7). This street is an important link to one of the few bridges, and with the growth in traffic it had become unsafe and unhealthy as the main entrance to the school, so there was pressure to recreate the approach in the courtyard behind. This court was very much a backyard, however, its potential having been curtailed by the addition of an ill-placed and inadequately sized sports hall. There was a further difficulty that the school had no adequate main auditorium or Festsaal for large communal events, so in a bid to solve these problems, a competition for replacing the sports hall was held in 1987, and won by Volker Giencke. The building was completed in 1992, though alterations of the old structure, also planned by Giencke, are still going on.

The main idea was to sink the new double sports hall about 10 m into the ground, recreating the outdoor space of the court on top of it at original ground level both as a *cour d'honneur* for the new approach and as an outdoor sports ground for summer use. With this strategy, Giencke succeeded in rendering a very large volume almost invisible, for only roof lights, service stack, and the wall and canopy of the entrance steps appear above the plane of the tarmac. The original competition scheme proposed a single large hall beneath, with tiers of spectator seating at both ends and changing spaces along one long side. This would have been divided into two sports halls for everyday use, but on ceremonial occasions it would have been usable advantageously as a single space. Fearing high costs and technical difficulties, the clients opted for the less ambitious version built, with two equal-sized halls divided by a central changing area, and spectator galleries still at the outer ends. This allows two rows of concrete columns marching across the centre of the building to carry a main roof structure spanning 18 m, as opposed to the 30 m minimum span needed if the space were clear.

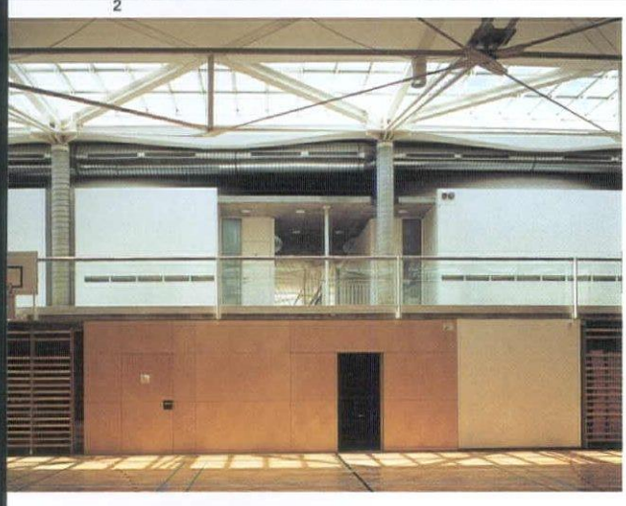
The central tract has two levels, the changing rooms being sandwiched between two open galleries above, with equipment stores and technical rooms below. Entry is from either end. To the north, there is an underground connection to the central stair rising to the entrance hall of the old school building, while to the south the sports hall has its own external entry stair. In plan this follows the skewed alignment of the adjoining building, the only departure from the orthogonal in the whole complex. This produces a tapered vestibule at mid-level which indicates the direction of approach, expanding towards the way out and up. In the court above, an in-situ concrete flank wall defines the dropping stair's edge, and a flamboyant canopy in folded steel draws attention to its position.

The potential claustrophobia of being in an underground building is mitigated to a surprising degree by the generous roof lighting, for there are bands of horizontal glazing three metres wide on either side of each hall, daringly sunk into the plane of the tarmac. In the court above, you walk straight across them, and since not only pedestrians but even vans of up to two and a half tons must be able to traverse them, these roof lights involved advanced glass technology including non-slip treatment to the upper surface. The central changing areas are lit by two large oval roof lights which project up as truncated cones, marking the cross-axis of the complex. Sunlight bounces off the inside of these cones, giving an inspiring quality of light which is intentionally and necessarily different from that of the glazing bands to the sides. The risk of solar overheating from the various roof lights is greatly reduced by the huge thermal inertia of the buried structure, which also renders the winter heating requirements relatively modest. The major environmental servicing requirement was the provision of mechanical ventilation, since natural cross-draughts are not available.

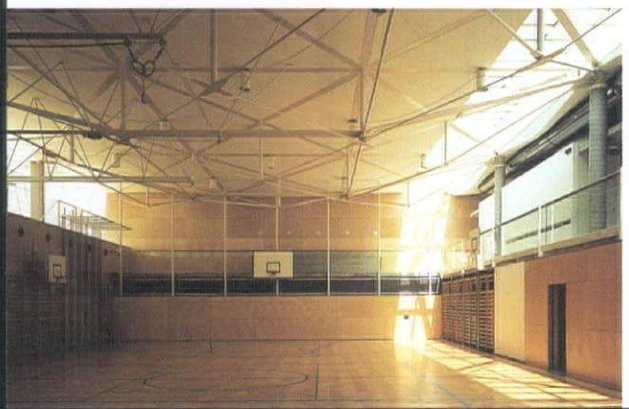
The building depends on modern technology and must have involved a good deal of sophisticated technical work, not least in the provision of waterproof retaining walls whose presence in the finished building is hardly evident. For contextual and pragmatic reasons, the plan needed to be simply orthogonal, a far cry from the same architect's flamboyant botanical glass houses which were under construction nearby at the same time (AR October 1995, pp47-51). Nor is the section particularly telling, apart from its revelation of the roof lights. But there is none the less a sense of architectural drama provoked by the treatment of the roof structure which is also the floor of the court above. Remarkably thin for a 30 by 18 m span, this has an elegant and very three-dimensional structure in which the various layers are on display.

The plane of the floor is defined by a network of rolled steel joists a mere 250 mm deep welded end to end at the intersections. This divides each sports hall into three bays one way and four the other, the subsidiary rectangles being cross braced with the same depth of joist. Within the depth of this steelwork is cast the in-situ concrete deck, leaving only the bottom flanges of steel visible except where the whole member traverses a roof light. Insulation, waterproofing, and a surface for traffic are all added on top, the whole thickness being revealed at the roof lights. The steel structure so far described is

2



3



4

1
The roof of the new sports halls, which are sunk 10 m into the ground and lit by 3 m wide glass strips that flank the light canons of the changing rooms. Strips are strong enough to take loads of lorries.
2
New southern entrance with its flamboyant folded steel canopy.
3
Corridor to old building from new south entrance at high level past changing rooms.
4
Sports halls are illuminated by glass strips on either side. In trusses, concrete and steel act together.
5
Edge condition shows how concrete and steel act together (and detail apparently due for snagging).

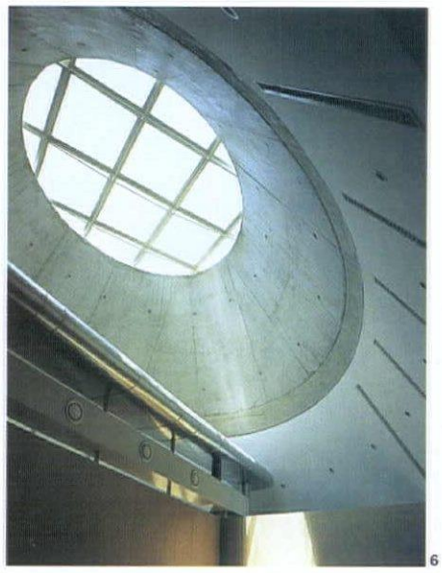


5

only the top member of a great three-dimensional truss, for to its underside is applied a series of down-standing struts, one at each intersection, which project increasingly towards the centre of the span, allowing ties to be added in a bow-shaped arrangement. The ties are of circular section rod welded onto flat plates at the joints, which stack up on a single pin projecting from the bottom of each strut. Diagonal rods of smaller section are applied as a second layer over the main ties to provide bracing. This method of jointing allows 12 ties to intersect in an orderly way, still showing the structural hierarchy in the layering.

The drama of Giencke's structure was more powerful in the raw construction than it is in the finished building, now that both materials are painted white and much superstructure has been added. For the users this is quietly appropriate, for arguably buildings should not be too rhetorical outside their given purpose, and the roof structure is still impressive enough within its more polite dress. For the critic though, the spectacle of buildings in the raw can be more telling, for it reveals the architect's view of materials and the way they are applied in layers, not just pragmatically according to the building process, but conceptually. Particularly interesting in this case was the marriage of welded steel and concrete, the component assembled as opposed to the cast. One striking detail is a webbed steel plate transmitting the load from a column to its concrete slab. Usually the problem of punch-through in this position is avoided by giving the concrete a mushroom head: Giencke evidently wanted to keep it within the thickness of the slab by relying on the superior strength of the steel.

Another intriguing element which was much more evident in the raw construction is the surprisingly thin slab of concrete above the changing rooms, supported on the most minimal of steel posts, and seeming to float. It would have collided with the main concrete columns, but is cut neatly away in a semi-circle to avoid all contact. The use of such heavy material here is a surprise because it is not really a structural element, more a visual space-defining layer or a baffle for the light coming down the conical light-canons. Practically speaking, it could have been a flimsy piece of superstructure, yet it was made part of the primary construction, of the first layer, of the skeleton of the building. In this role, it repeats at smaller and more delicate scale the relationship between steel and cast concrete that occurs also in the primary structure, and so indicates a change of mood and scale, a switch to intimacy for smaller rooms within the large. This provocative element is a reminder that questions of building and construction are no mere technicalities to be disposed of in the most efficient technical way, but potential bearers of subliminal meaning.

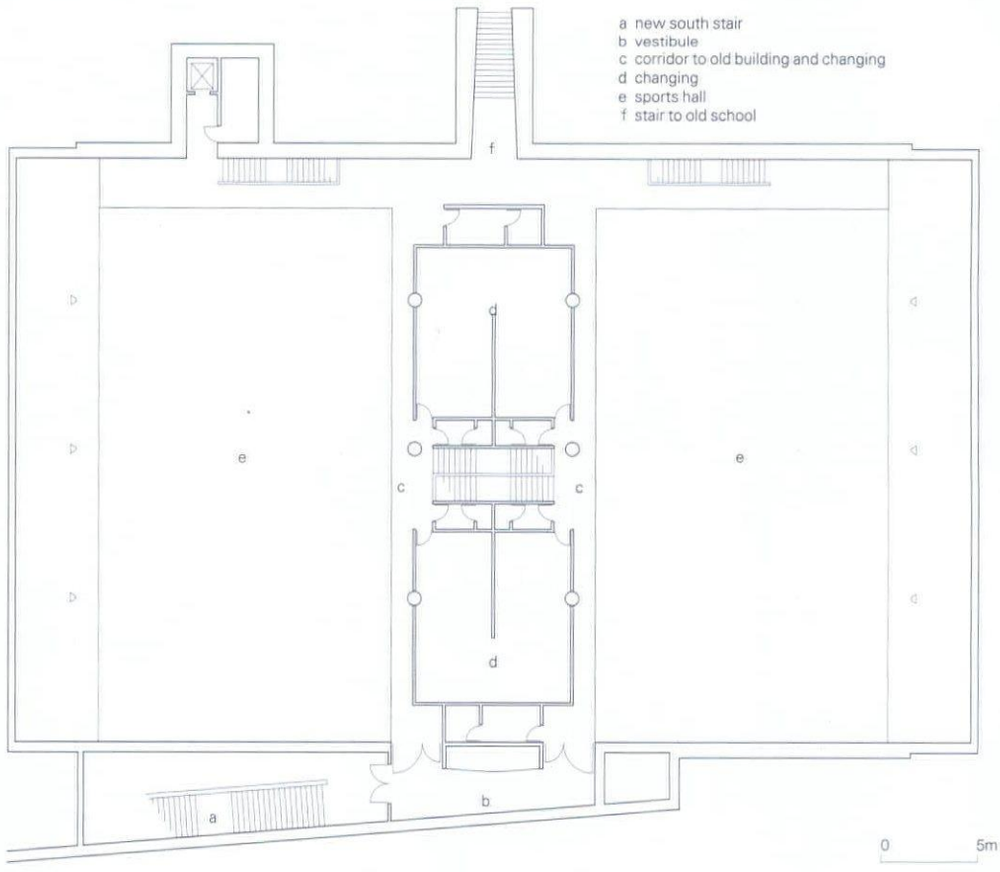


6

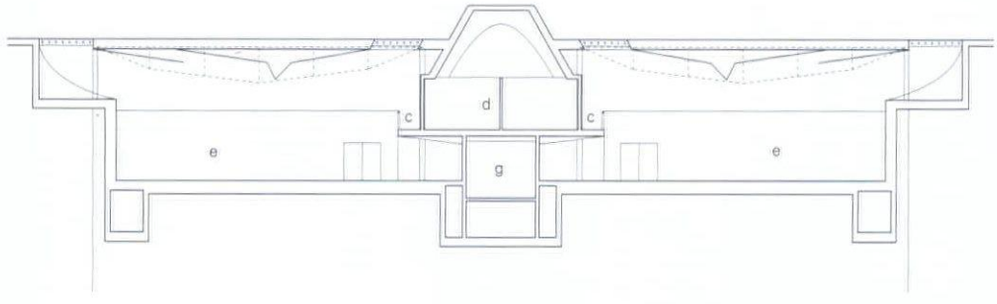
School sports halls, Keplerstrasse, Graz, Austria
Architect
Volker Giencke

Architect
Volker Giencke, Arthur van den Bruck and Herwig Kleinhapl, Graz
Engineer
Manfred Petschnigg

6
Light canon over changing room.



sports halls: upper level plan



section



1

THE GENESIS OF EDEN



2

1
Section through model of rainforest biome with waterfall and jungle village: surely latter carries verisimilitude too far.
2
Structure skirts south quarry walls bearing on rock at top and bottom.

This bold project uses the latest technology and materials to create a dramatic centre for studying the world of plants by transforming redundant mineral workings into a modern rival of the Crystal Palace.

Ecological centre, St Austell, Cornwall, England
Architect
Nicholas Grimshaw & Partners
Engineer
Anthony Hunt Associates

The Eden Project is to be a huge device for demonstrating the range of biodiversity and the manifold interactions between humanity and the world of plants. The project is to be built in a disused clay pit near St Austell in Cornwall. Location in the south-west of England is a result of local initiative, but the mild climate, lavish rainfall and relatively balanced day length render the peninsula one of the best locations in Western Europe for the experiment.

The landscape of Cornwall is made mysterious and sometimes magical by the local china clay industry, which leaves great white tips and pits as the kaolin is extracted from the rotten granite that underlies much of the rough brown moorland surface. The Bodelva pit is one of these workings and it offers a sheltered south-facing curve surrounded by parkland. Its 14ha area is nearly worked out, and the owners have offered the Eden Trust an option on purchasing the site prepared for building work.

The proposal uses the cliff-like sides of the quarry as support for a series of greenhouses which contain different biomes, areas which reproduce particular climatic conditions to foster cultures of plants from Mediterranean, desert, rainforest and subtropical parts of the globe. The aim is to generate consistent worlds, rather than promiscuously mixing species from different parts of the world – for instance, the flora in the tropical rainforest biome will come from a particular part of the Amazonian jungle, rather than being a mixture of plants from South America, Africa and Indonesia as in most botanical hothouses (other specific territories may be added later).

The design of the complex is by Nicholas Grimshaw & Partners and Anthony Hunt Associates, and in some ways the structure resembles that of the Grimshaw/Hunt masterpiece, the continental platform at Waterloo Station (AR September 1993). Trussed steel arches form the basis of the structure. They are connected by pin joints to fixings in the top of the rock walls round the pit and on the old quarry floor. The span and height of the

conservatory roofs changes continually with the rise and fall of the rock face with the width ranging from 15 m to 120 m and the pitch changing from 30 degree slopes to flat. Each truss is calculated for its particular position (the analytical and constructional techniques used at Waterloo have shown how this can be done economically). The trusses have a tubular central compression boom which is fattest at the point of maximum bending, a point which differs in each truss according to its curve (the tapers are made by sleeving together standard sections). The compression boom is stiffened by steel rod tie booms which are connected to it by struts. Between each pair of main trusses is a secondary structure in which a simple arched tube is held by struts and ties that connect it to the top and bottom booms of the main arches.

All this is, of course, to support the weatherproof membrane. This is made of lightweight transparent ETFE (ethylene-tetra-fluoro-ethylene) foil held in 3 m by 10 m aluminium frames, themselves fixed to the steel structure. Three sheets of foil are held within each frame and are inflated into pneumatic pillows by a low-pressure air system which is continuously monitored by an electronic building management system. The skin is expected to achieve more than 90 per cent transmission of visible and ultra-violet light, but the transparency can be reduced locally by pigmenting the film. The pillows are sensitive to imposed loads and can be pressurised individually by fans at the base of the arches which are powered by solar voltaic cells: the skin is in effect flexed by the sun's energy.

In summer, temperature in the conservatories is held down by encouraging convected ventilation from the base of the curves to their upper connection with the rock walls. For the hottest times, there is a powered ventilation system, and the rock walls are used as a thermal sink, which soaks up heat in the day and emits it at night, balancing diurnal temperatures. In winter, there is artificial heating, balanced by the thermal storage of the rocks and internal lakes.

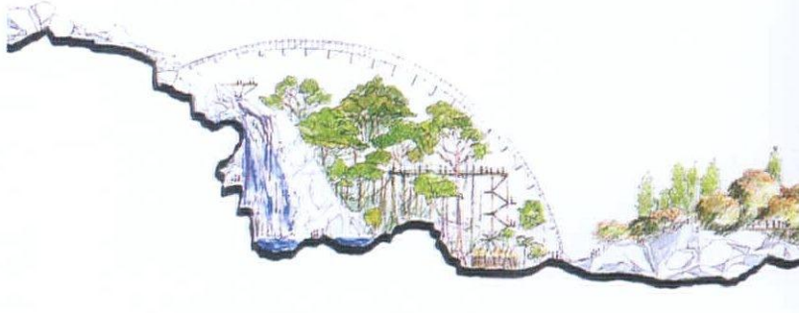
The whole affair is approached from the southern lip of the pit, whither visitors arrive by shuttle bus from the car park. They descend to a visitor centre, the oval glazed carapace of which slithers down the quarry side like a huge and elegant prehistoric crustacean. From here, visitors cross a bridge over the pit floor to enter the first of the biomes (Mediterranean) which is the start of a kilometre long walk through the whole complex. The basic route is clear, from biome to biome with restaurants and service spaces at each junction. But, particularly in the rainforest section, there are several internal paths, some well above ground level, so visitors can appreciate the ecologies of the different levels. (The structure rises to 60 m in this biome, and it is the only greenhouse in the world able to contain full-grown tropical trees.) This enfilade-like arrangement of internal circulation can be subverted at many points by leaving the heat of the conservatories to walk through the garden at the bottom of the old quarry which is laid out with species native to Cornwall, and with other temperate species related to the ecologies inside (for instance New Zealand and Tasmanian flora next to the sub-tropical biome).

Eden is a big, brave and exciting project that will not only offer instruction and entertainment to the public but provide a centre for research into environments that are rapidly being degraded in their natural locations. Using some of the most ingenious creative thinking in Britain today, it relates the nation's past, as one of the scientific cultures most concerned with flora in every way, to an unknown future in which the world of plants will certainly have to be taken much more seriously than it is now. It is proposed as a candidate for major funds from the Millennium Commission which is funded by the National Lottery. If the commissioners decide not to support it, the millennial celebrations will be shown to have the lack of cultural guts that dogs most other aspects of life in these islands today – and makes backward-looking Britain a laughing stock worldwide. P.D.



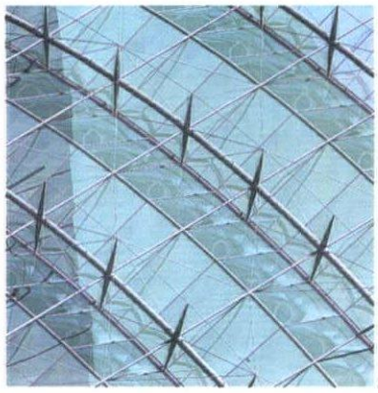
layout plan

a car park
b visitor centre and administration
c bridge
d Mediterranean biome
e desert biome
f rainforest biome
g subtropical biome
h back-up greenhouses
j secondary car parking



general section

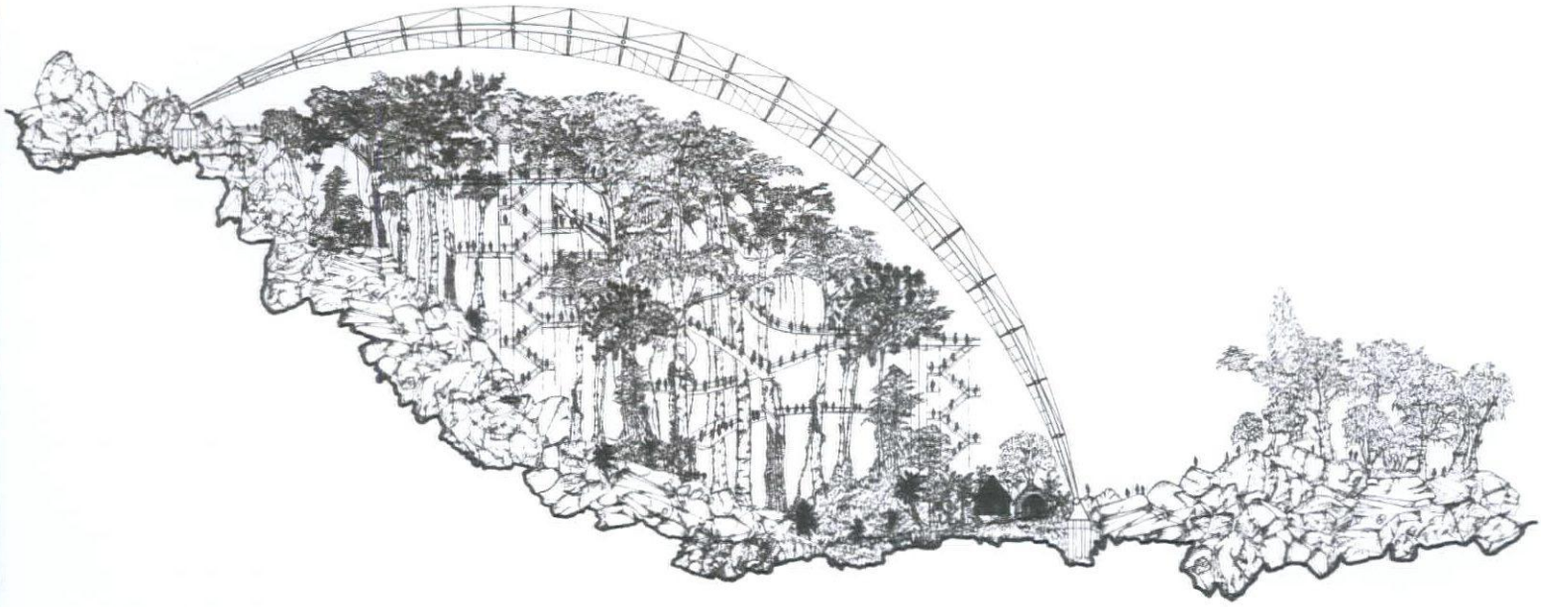
Client
Jonathan Ball, Tim Smit
Architects
Nicholas Grimshaw & Partners, London: Nick Grimshaw, Andrew Whalley, David Kirkland
Structural engineers
Anthony Hunt Associates, Cirencester: Tony Hunt, Alan Jones, Nigel Ellis, Martin Jones, Mark Simmonds
Consulting engineers
Ove Arup & Partners
Quantity surveyors
Davis Langdon & Everest
Landscape architects
Land Use Consultants



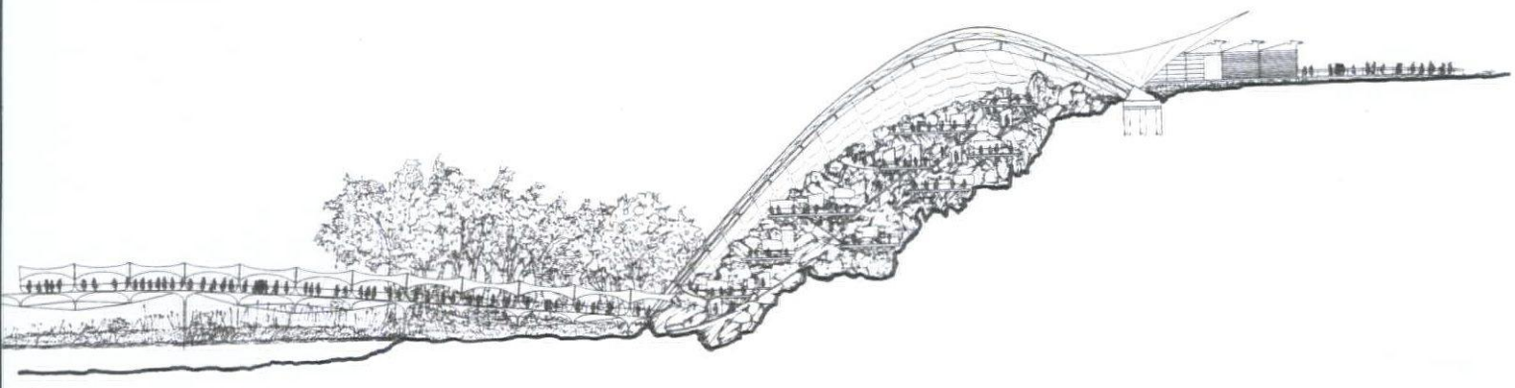
3

Ecological centre, St Austell, Cornwall, England
Architect
Nicholas Grimshaw & Partners
Engineer
Anthony Hunt Associates

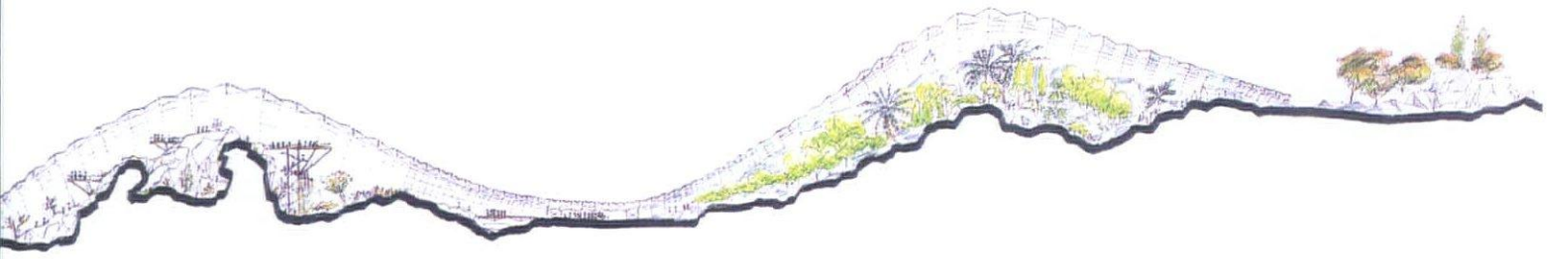
3
Structure consists of main trusses with secondary tube arches between, connected by struts and ties. Glazing is pillows of plastic foil inflated as necessary to cope with imposed loads.



section through rainforest biome

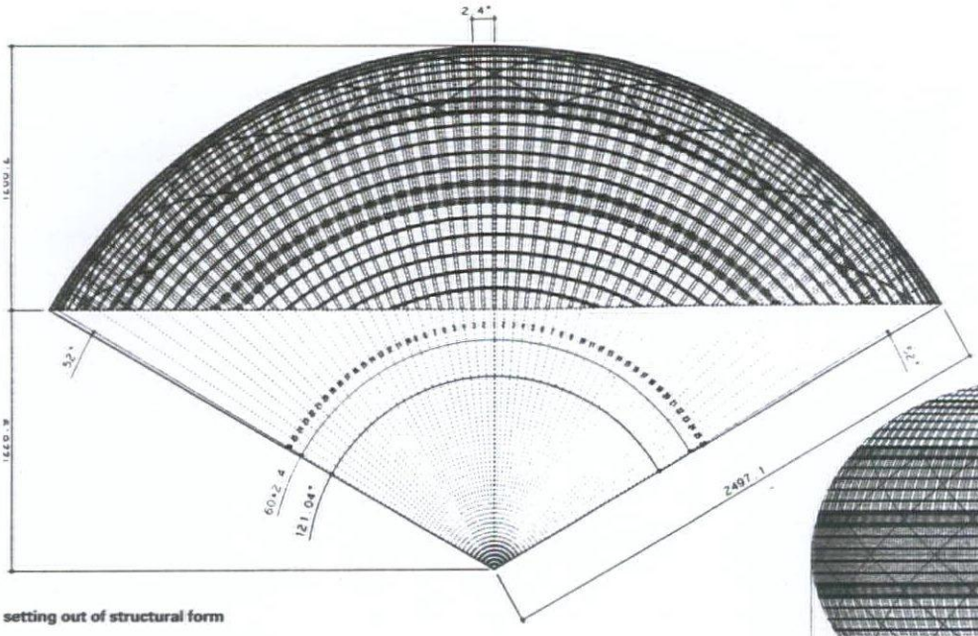


section through bridge and Mediterranean biome

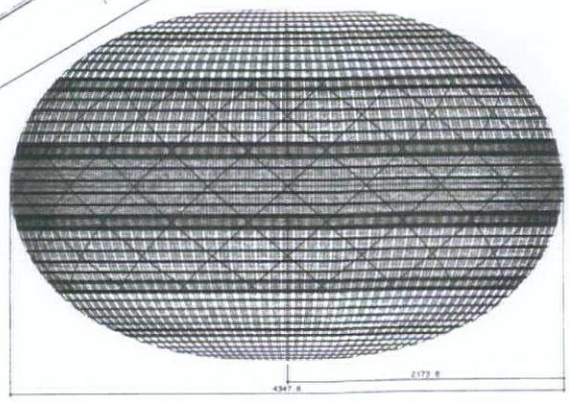




Seed house and forestry centre, Marche-en-Famenne, Belgium
Architect
Samyn et Associés



setting out of structural form





site plan

SOWING THE SEEDS

Using bentwood in building is an ancient practice, traditionally common, for example, in the constructions of such disparate cultures as Mongolian yurts and Zulu round houses. The delight of these organic looking confections consists in appreciation of the geometric precision underpinning peculiar tradition, craft and apparent spontaneity. Conversely, the latter qualities seem to exist in modern, more self-conscious elaborations of the basic type.

Hooke Park school and research centre in Dorset, locally built of local green forest thinnings, was designed[1] with contemporary engineering vision, but the first impression on seeing the building crouching in a clearing is of something much more ancient. Materially rustic, but simple in outline and complex in underlying constructional principles, its appeal, like that of the weaver bird's nest, is atavistic.

The idea of engineered rusticity, drawing on local supplies of wood to create an economic structure appropriate to purpose and climate, lends itself naturally to the cause of green architecture – the proviso of course being ecological harvesting of the basic material.

In Belgium, Samyn et Associés' design of a new seed house and forestry centre, at Marche-en-Famenne, follows Hooke Park in drawing on local resources and engineering expression, but takes the type a step further away from craft, looking back to Paxton and ahead to the poetry of modern engineering. But still, aesthetically, there is the same intriguing tension. The plan of the building is a pure ovoid, appropriately so considering its seminal purpose; but its scale and toroidal[2] carapace make it endearingly biomorphic.

The seed house is set in a grove of 200 year old oak trees and is devoted to sylviculture, providing facilities for testing, nurturing and storing seeds from the Walloon forests. Its presence is a result of the federalisation of Belgium, and the Walloon Region's public commitment to independence, to local ecology and to economic prosperity. In providing forest thinnings for the seed house's construction, the Walloon administration asked for a structure showing what adventurous things could be done with wood.

1
Toroidal carapace detail.
2
Seed house has an organic presence in forest clearing.
3
Toroidal carapace is a framework of double wooden arches covered with glass tiles.

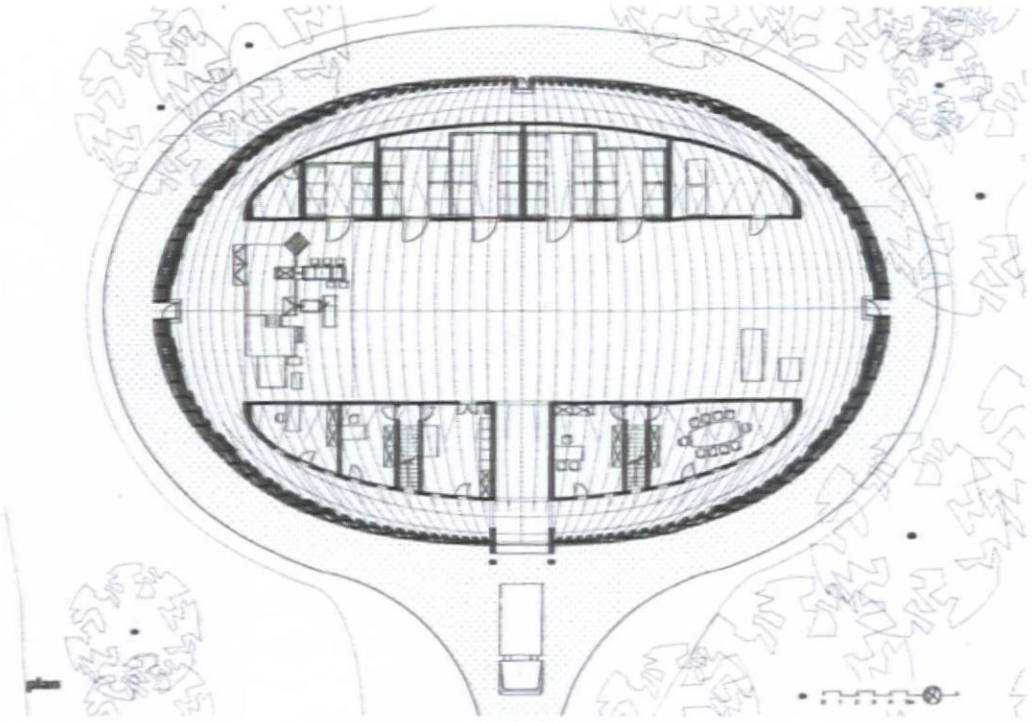
1



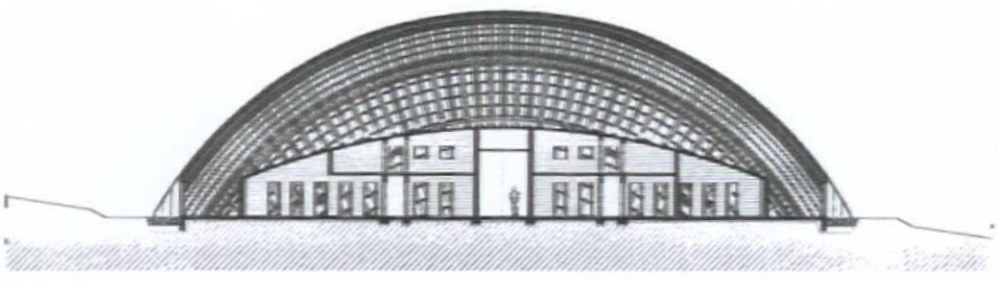


A new bentwood structure for sylviculture in a forest clearing in the Walloon region of Belgium celebrates its ecological purpose and the poetry of engineering through construction and material.

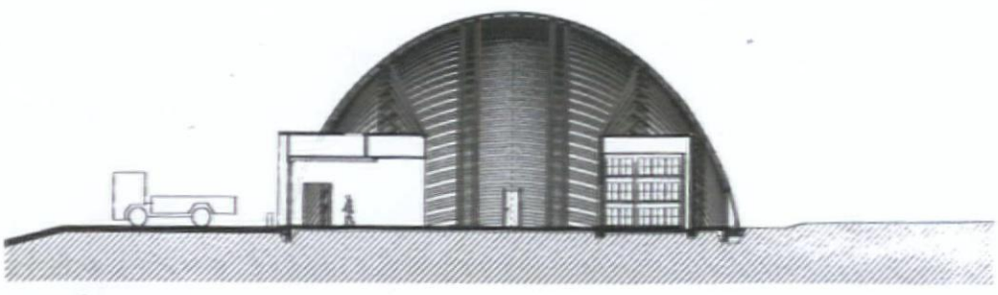




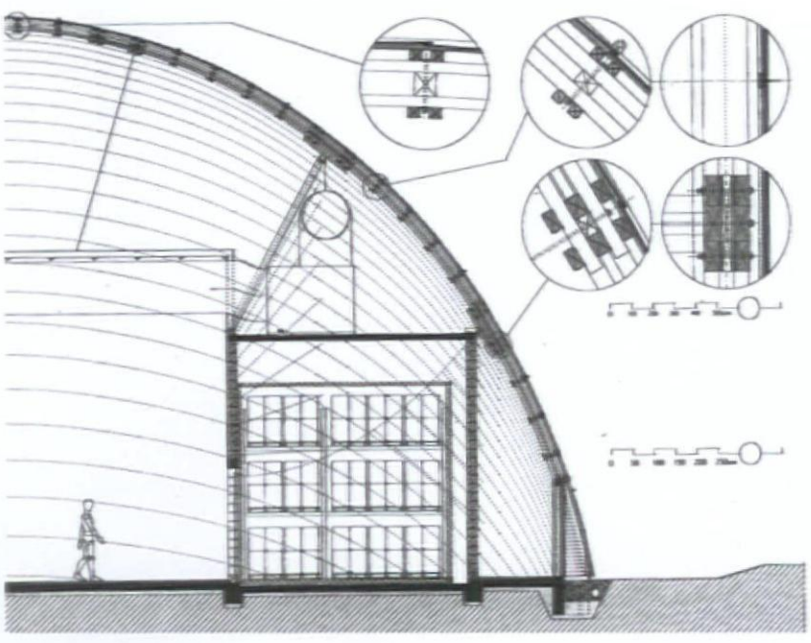
plan



long section



cross section



constructional detail

The domed cover of the building is a toroidal framework of bentwood arches, each clamped at the bottom to a reinforced concrete apron; each is double layered, curved and composed of pieces of wood of rectangular section. Arches run cross-wise and lengthwise to ensure three-dimensional stiffness. The frame is covered with large tiles of laminated reflecting glass. Within the dome are subsidiary structures – concrete boxes from which struts spring to take some of the horizontal loads. The boxes contain laboratories, storage and offices. The central nave is reserved for large machines that treat and dry seeds.

After extensive tests, Samyn abandoned the idea of using a development of the Hooke technique of bent green wood. Tests had suggested the wood would crack on being subjected to rapid drying as it would be in this case. The industrially dried wood for the seed house was bent by steam moulding, and then impregnated with fungicide and insecticide before being dried out.

The wooden structure with its raincoat-like covering provides little protection against the cold. In winter, radiant panels in the work zones ensure a comfortable ambient temperature and a ventilation system removes excess humidity and reduces condensation – particularly important when pine cones and other humid seeds have been gathered in. In summer, the building's envelope of laminated reflective glass reduces insolation; the frame and the overhanging trees shade the building. Fresh air can be admitted through vents along the bottom of the dome, with stale air being drawn up through ducts and expelled over the west door.

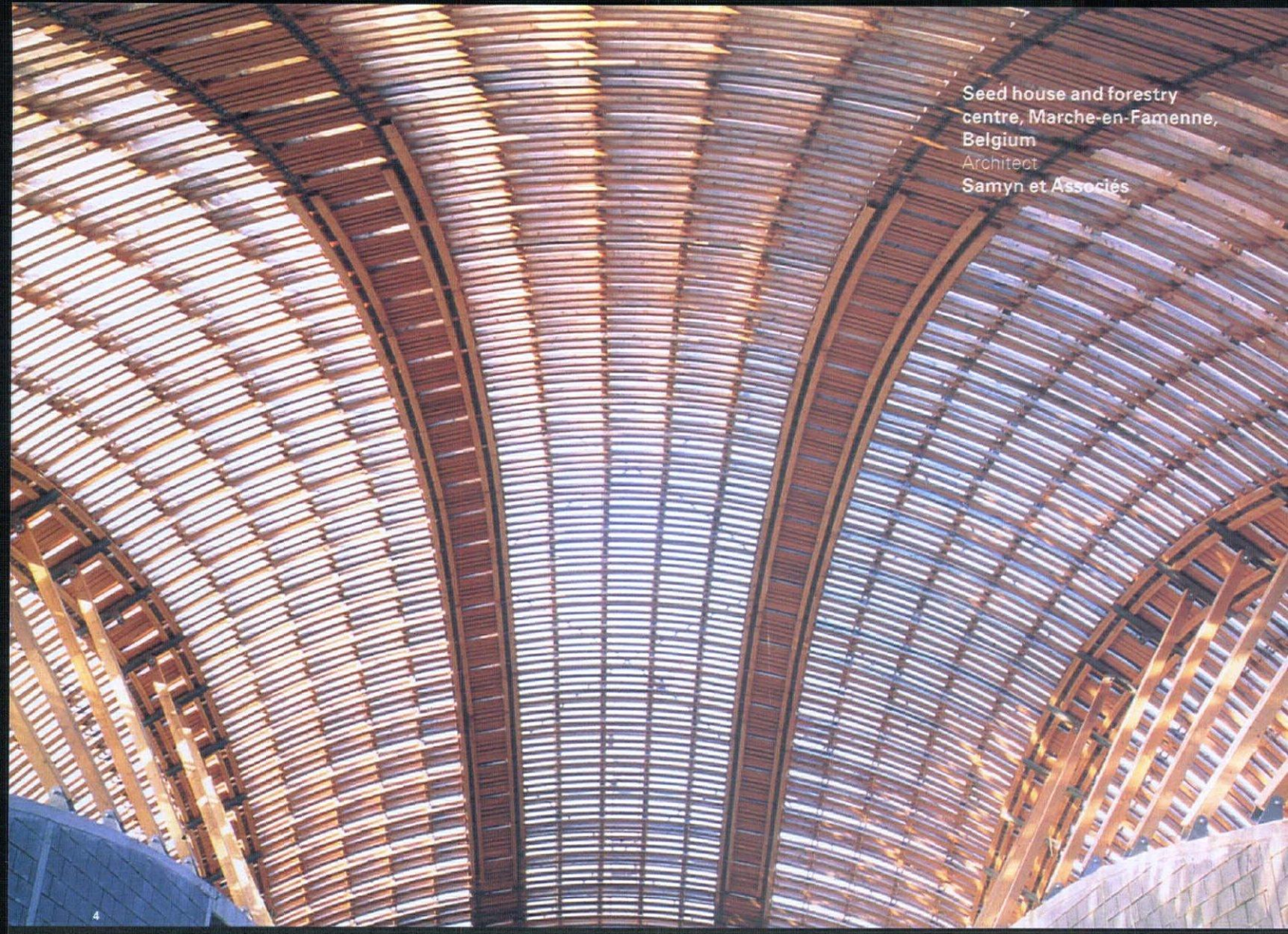
The sense of scale and order in this enchanting – and essentially modest – building reaches exhilarating heights internally. The light-striped nave with its soaring arches encloses the functions of the building in a contemplative and ecclesiastical atmosphere.

PENNY MCGUIRE

1 By Ahrends, Burton & Koralek, with Buro Happold and Frei Otto (AR May 1990).
2 A toroid is formed by rotation of a point round a constant curve. If this curve is a circle, the resultant form is a ring or torus. The form here is a segment of a torus cut by a plane parallel to a diameter.

Seed house and forestry centre, Marche-en-Famenne, Belgium

Architect
Samyn et Associés



4



5



6

Architects/engineers
Samyn et Associés
Project architects: Philippe Samyn, R. Dalaunoit, D. Melotte, Gh. André
Photographs
Bastin Evrard

4
Soaring arches of the nave evoke the ecclesiastical.
5, 6
Laboratories, cold storage rooms and offices arranged on either side of central nave for large machinery. Arches propped off blockwork with struts.



1



2



3

1
Longitudinal roof beams are only propped directly by a slender column between the arches. Elsewhere...
2,3
...they are supported on ties that transfer the loads to the arches.
4
The station is straddled by Portzamparc's boot (the sole of which can be seen right), and by the rue Corbusier viaduct (left).
5
The roof is composed of strips of glass between curved steel troughs, to give the feeling of lace floating above the train.



4

THE BOOT AND THE LACE MAKER

The architects wanted to make a station in which people would begin to dream and have a sense of the excitement of travel. Inventive use of modern materials and structural theory gave form to the endeavour.

Lille seems to make architects bombastic. The *Trains à Grande Vitesse* (TGV) will perhaps make it the centre of northern Europe (AR September 1993, p72), and in an effort to draw attention to the city, a quite reasonable architect like Portzamparc has produced his ridiculous boot skyscraper for Crédit Lyonnais ,and Koolhaas has been even more absurdly gestural than usual in his congress centre.

But the architects of the SNCF *(Société Nationale des Chemins de Fer)* have not been seduced by the heady local atmosphere. Jean-Marie Duthilleul, SNCF's chief architect, has spelled out rules for the new TGV stations which include the very sensible requirement that stations 'should look like stations' by drawing on archetypes; they 'should make people dream', remain in cities and be clearly understandable to passengers. (Why don't all railway companies have architects like this?) In Lille, Duthilleul called for a space as free as possible from structural supports, a roof which should be 'like fine lace floating above the train', emphasising the quality of light in this part of northern France.

The SNCF architects and Ove Arup & Partners evolved a roof structure based on paired steel arches set at 12 m centres. The slender tubular arches bear on the concrete lower structure and to props in the glazed wall. They are prevented from buckling by ties, and other cross-bracing ties provide longitudinal stability to the whole structure.
The roof's elegant curves are intended to float over the structure, so connections to the roof beams are made with cable ties rather than struts. (The strategy is basically very similar to the one adopted by the same consultants for the top floor of Will Bruder's Phoenix library, p48.) The simple steel longitudinal beams of the roof are stiffened by ties attached to descending struts. Similar ties connect the beam assemblies to upstands on the arches which do not themselves touch the beams: hence the deck's hover.

Insubstantiality is emphasised by making much of the roof as thin strips of glass, separated and supported by steel troughs formed into the double curves. The troughs bear on the longitudinal beams and are clad with rockwool to provide sound absorption. They are covered externally with expanded metal, and internally with perforated aluminium panels, giving a smooth finish in which the curves are emphasised by the pattern of the perforations. The glass walls are simple and satisfactorily plane and transparent, but not particularly noteworthy. The joy of this station, which makes it much the best new building in Lille, is the roof which so clearly fulfils Duthilleul's exhortation to make 'fine lace floating above the train'.

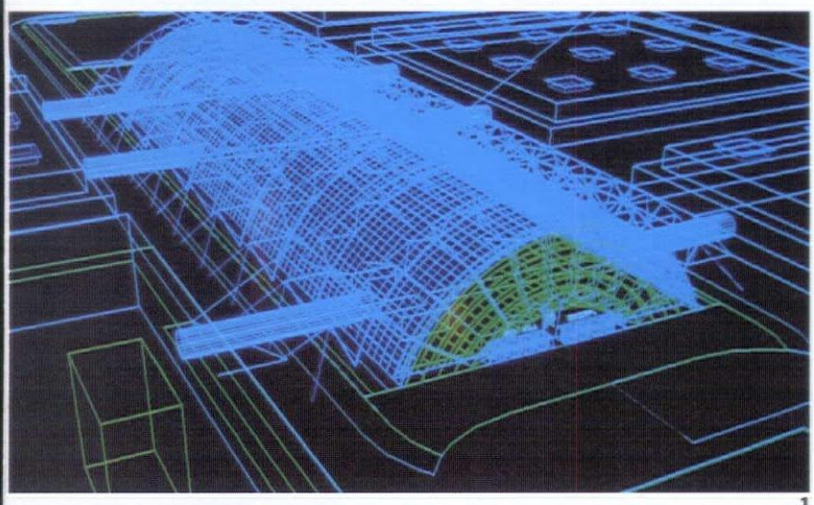
P.D.

All quotations and drawings are from 'Euralille: the TGV Station Roof' by Sophie Le Bourva and Jane Wernick in The Arup Journal *vol 30, no 2, 1995.*

Architect
SNCF APG, Paris. *Chief architect* J-M.Duthilleul
Engineer
Ove Arup & Partners: Andrew Allsop, Maki Banfi, Chris Barber, Paula Beever, Sean Billings, Simon Cardwell, Brian Duck, Ed Forwood, Lesley Graham, Sophie Le Bourva, Alistair Lenczner, Alain Marcetteau, Sean McGinn, Craig McQueen, Chris Murgatroyd, Strachan Mitchell, Neil Noble, Jane Peel-Cross, Peter Rice, Adrian Robinson, Lizzie Sironic, Darren Sri-Tharan, Jane Wernick, Derek Woodcraft
Steelwork contractor
NV Buyck
Cladding consultants
RFR
Roofing contractor
Laubeus SA
Photographs
Peter Mackinven

LEIPZIG'S LUMINOUS VAULT

The glazed shed is one of the great archetypes of the last 150 years. This example in Leipzig achieves new levels of transparency and elegance with remarkable detailing.



1

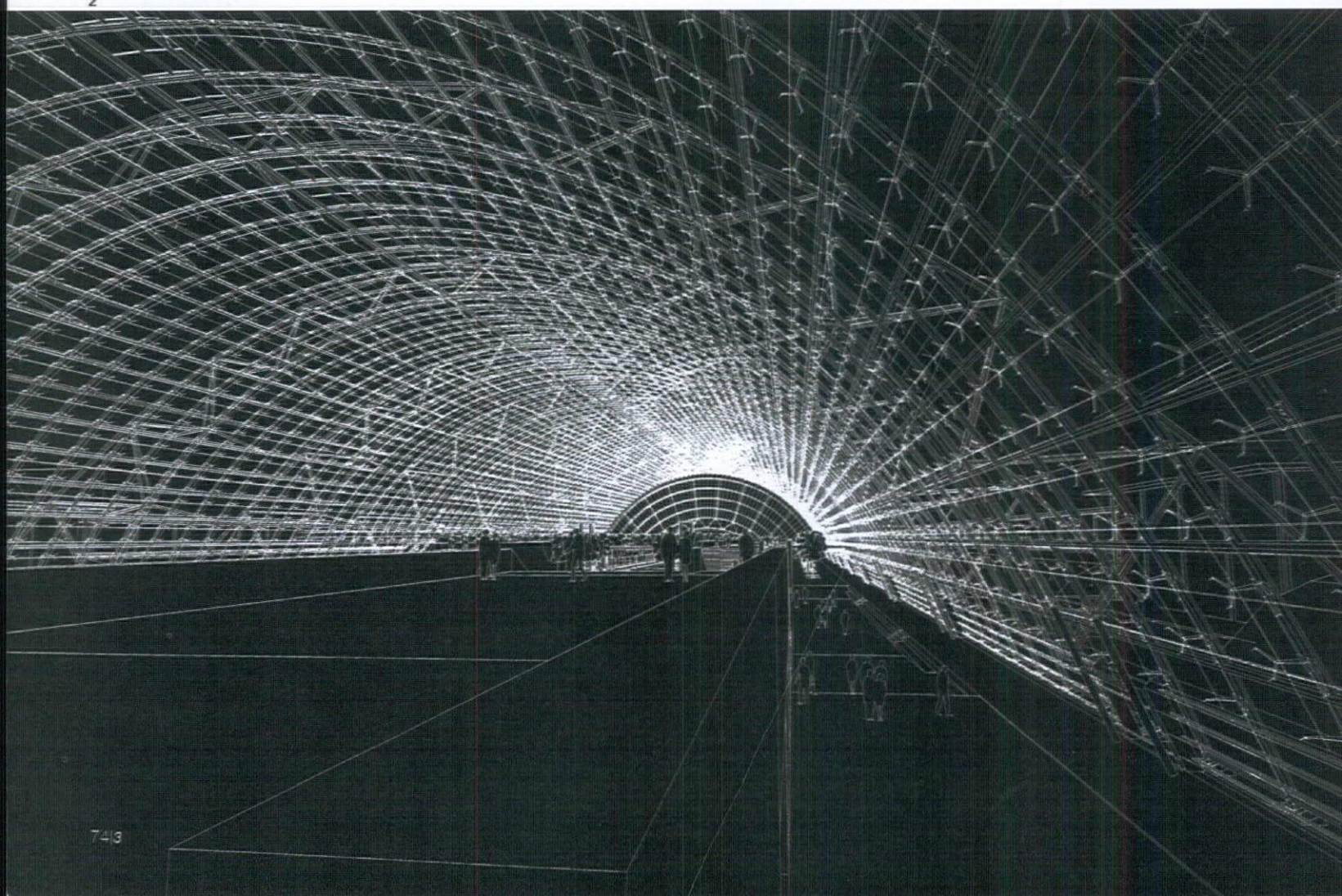
1
Glass hall acts as central circulation space and is connected to surrounding exhibition and conference spaces by glazed bridges. Primary structure is arched triangular trusses which carry the secondary square-gridded shell of tubes.
2,3
Hall is intended to be a landscaped valley between exhibition spaces. Fire escape is through panels in side which are automatically raised by a sort of reverse guillotine action when smoke is detected (one of these can be seen clearly right,2).

Leipzig is trying to regain some of its pre-war importance as a great centre of commerce and trade, and one of the chief devices in its campaign is to be a huge new exhibition and conference centre which opens this spring. The international competition for the Trade Fair was won by von Gerkan, Marg & Partner in 1992 and they asked Ian Ritchie Architects to collaborate with them on the design of the central glass hall which unites all the exhibition and conference spaces.

The aim was to provide a great central circulation space, through which all visitors will pass. It has to be extremely clear in its structure and organisation to allow routes to be obvious, and it must accommodate a wide variety of functions from reception to relaxation, formal to informal events. The architects conceived it as a landscaped valley between the two ranks of exhibition halls and so it had to have a glazed roof as transparent as possible with obvious structure minimised. The span is 79 m; the length 243.75 m and the height 28 m to the crown (it has to enclose full-grown trees). The intention has been amply fulfilled: a smooth and airy vault seems to float over the valley, an effect reinforced by the choice of low-iron glass, which does not have the green cast of ordinary glazing.

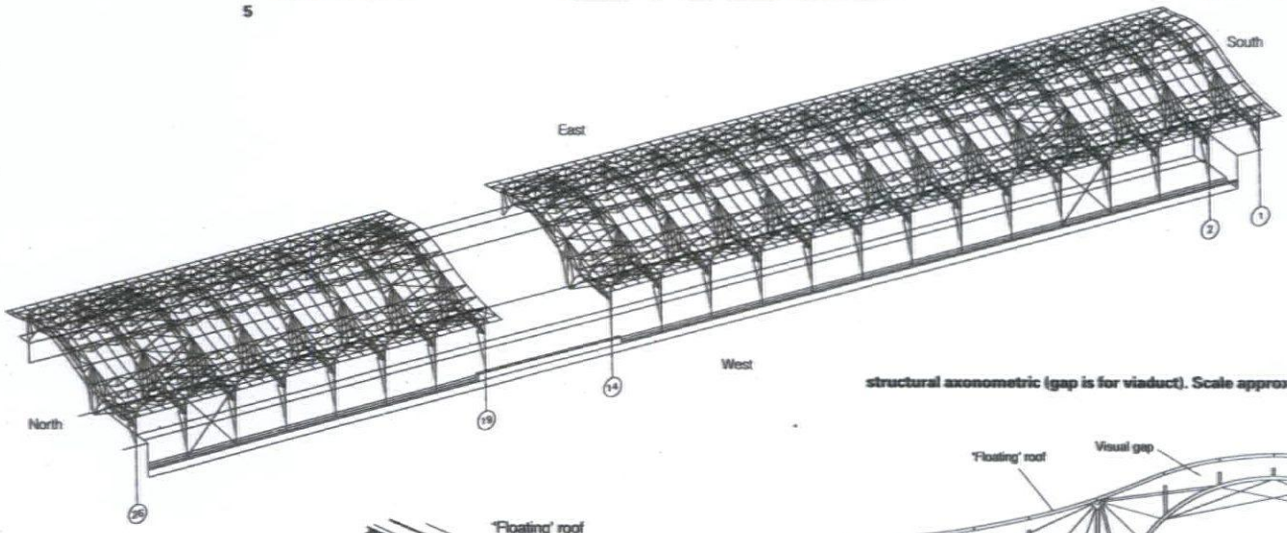
The basic approach is simple: arched trusses of triangular cross section span the whole width of the huge space at 25 m centres. To them is attached a 3.125 m square grid of tubes which forms a curved shell. (The external diameter of the tubes is constant, but their walls vary according to local stresses.) The shell and the

2

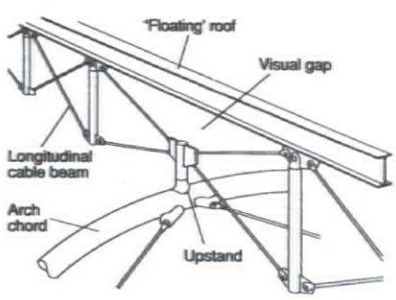




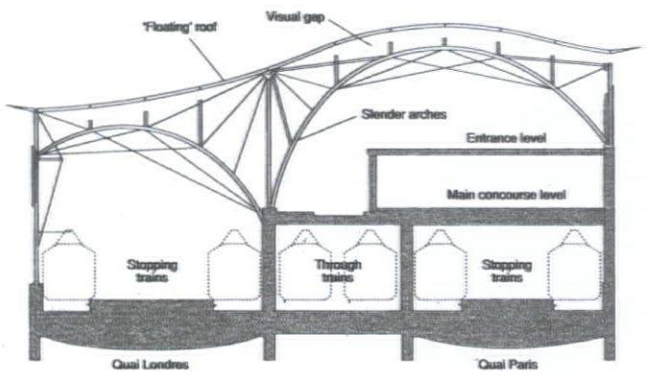
5



structural axonometric (gap is for viaduct). Scale approx 1:2000



arch to roof-beam connection



section

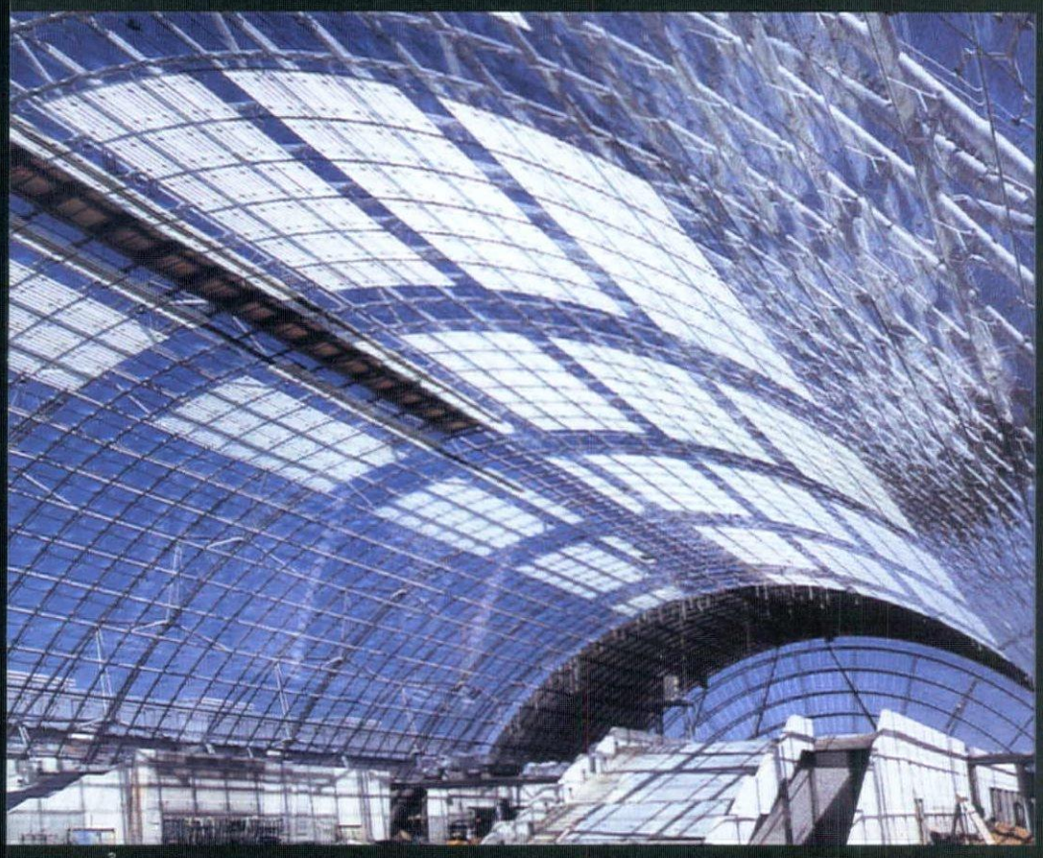
4
Connections between arched truss and square grid include stabilising outrigger struts.
5
Cast steel arms which connect tubular elements of square grid to glass.

6
Dissected axonometric showing major components of vault and self-supporting end walls. Latter made as a series of concentric arched trusses.
7
Glass sheets hang from finger fixings on cast steel arms and are silicone jointed.

Exhibition and conference centre, Leipzig, Germany

Architect

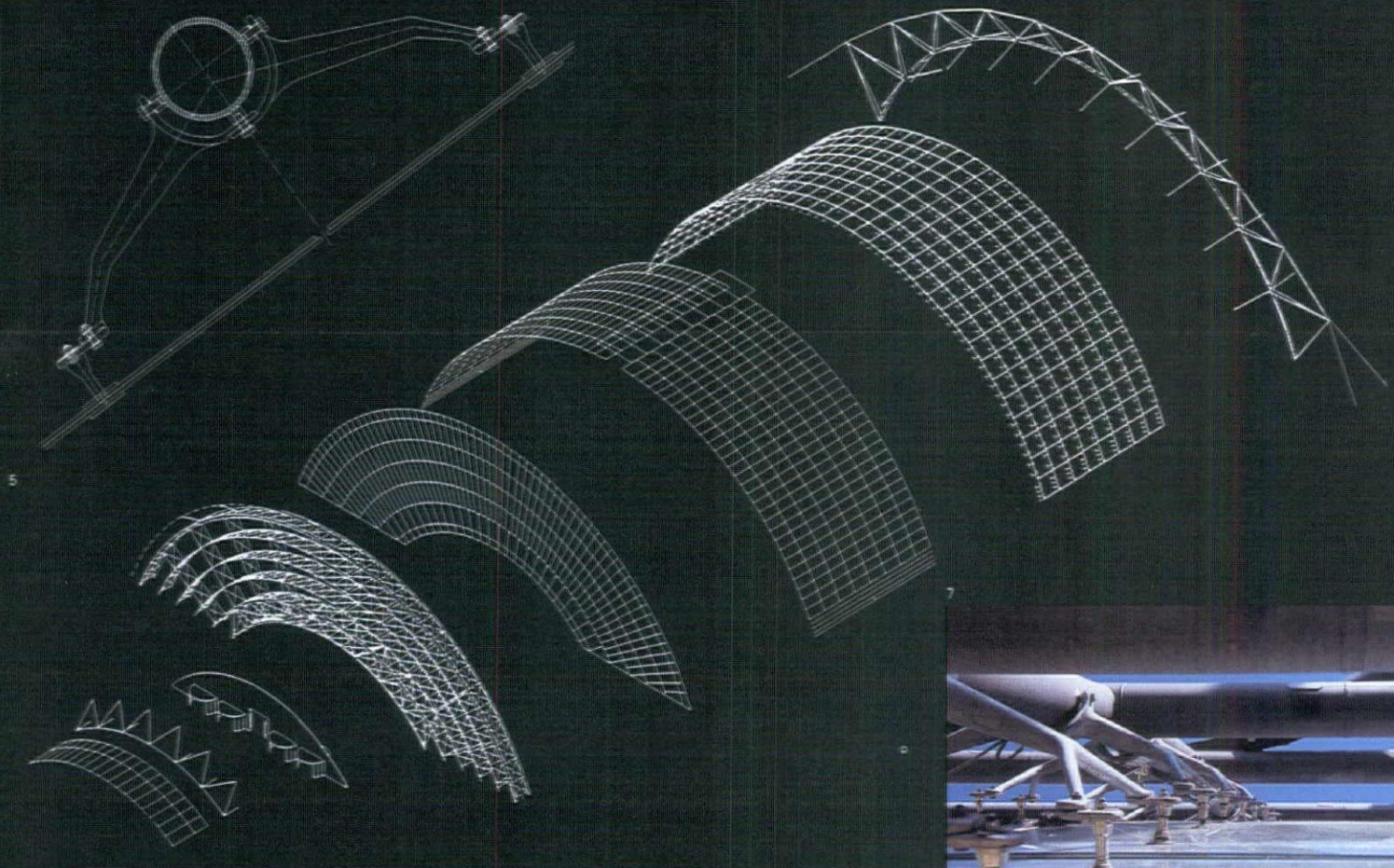
Von Gerkan, Marg & Partners
Ian Ritchie Architects



3



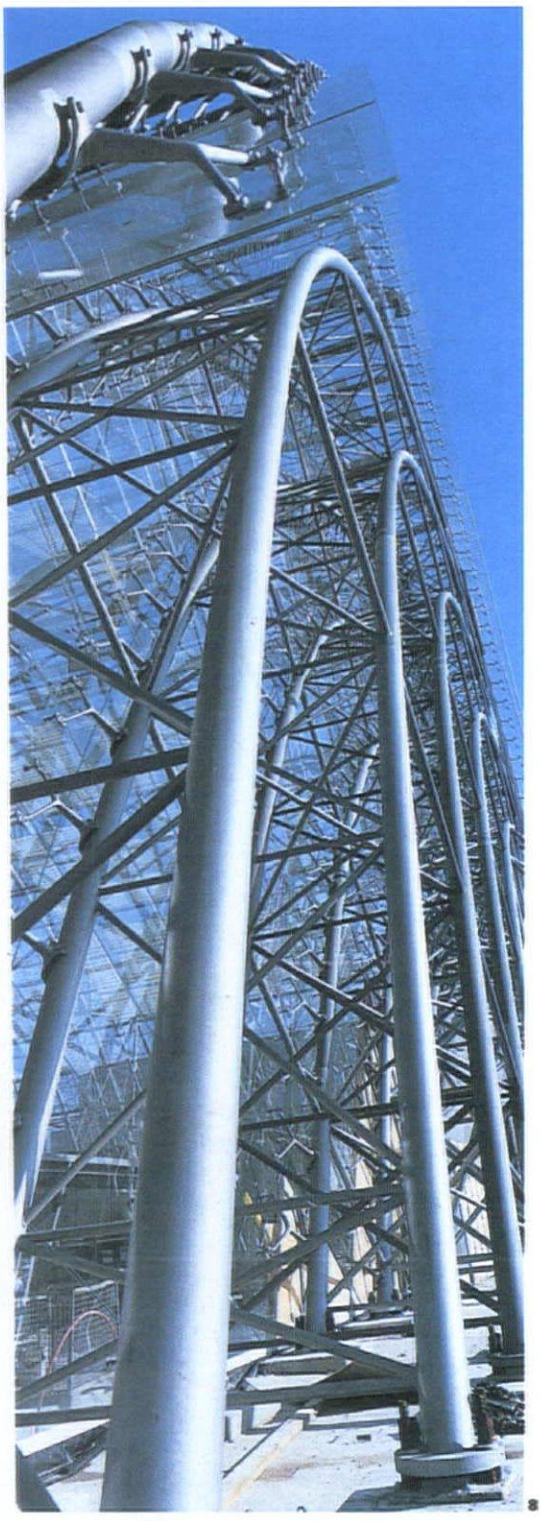
4



5

6

7



thin blade-like trussed arches are further related by outriggers which stabilise the shell and add increased longitudinal stiffening. The glass skin is suspended from the grid by cast steel arms, and almost all the glass panels are of standard size (3.1 x 1.55 m). In this, the vault is very different from Nicholas Grimshaw's Waterloo Station train shed (AR September 1993) which, because of site constraints, had to curve in two directions and taper as well, so every pane was different. Another difference between the two is that the Leipzig building must be more weather-tight than the London one. So almost all joints between glass sheets are in silicone and the panes are laminated with a thin pvb filling between two layers of toughened glass.

The shell and trusses are all bolted together on site. As are the end walls which, partly to allow for thermal expansion along the length of the hall, are completely independent structures, designed as a series of concentric arched trusses bearing directly onto the ground. Flexible gaskets connect the glass vault and the vertical glazed arcs at each end.

The main problems encountered in designing such a spare structure were movements due to heat and imposed loads (wind, snow and so on). Movements in the plane of the shell are expected to be up to 15 mm in each square of the grid (ie the 3.125 m squares can deform to rhomboids by this amount). Hence extremely sophisticated glass fixings were evolved that will allow the glass panels to remain roughly in the same relationship to each other while the supporting grid (and the bearing arms which are welded to it) writhe about overhead. Most of the glass fixings are articulated to give degrees of freedom where they attach to the support arms (though one attachment point in each pane is fixed). To eliminate transfer of local bending stresses to the panes, the fixings contain a spherical bearing (in effect a three-dimensional pin-joint) in the plane of the glass. Deflections in other directions to the plane of the shell are fundamentally catered for by the flexibility of the silicone joints. Similarly, the silicone's elasticity takes up the main thrust of thermal movement (which can be up to 250 mm along the whole length of the vault).

Tolerances in the steel structure are much greater than in the glass skin. To reconcile the two, fingers at the ends of the cast steel arms can be adjusted with a slot and radial movement in the plane of the shell and by screw-adjusting the length of the fingers in the plane at right angles to the glass.

The aim is to generate a modified external climate which never falls below about 8 degrees Celsius. Temperature in winter is raised by underfloor heating coils and the stone paving and trees are partly intended to remind people of the semi-external nature of the climate in the vault. In summer, the coils circulate cold water for cooling, but the main reduction in temperature is expected to be by ventilation. The crown of the vault opens, as do glass panels at low level, allowing high ventilation rates. Protection against solar radiation is given by fritting the glazing above normal lines of view on the south side, and by local shading. In summer, treated rainwater can be sprayed over the glass to add to cooling by evaporation. This helps keep the transparent skin clean, but the main cleaning will be by robot, due to be installed this autumn.

This must be an interim report, for at the time of writing the whole complex is not yet in use, and only time will tell whether the many sophisticated design moves will all work, and particularly whether they will all work in unison. But, so far, all is well: the vault took a mere 11 months to erect and creates one of the largest and most elegant glazed spaces ever made.

ELIZABETH MILES

Masterplan architects
Von Gerkan, Marg & Partners, Hamburg
Architects of glass hall
Ian Ritchie Architects, London: Ian Ritchie, Simon Conolly, Henning Rambow, Elden Croy, John Randle
Structural engineers
IPP Köln
Environmental engineers
HL Technik München
Landscape architects
Wehberg Lange Eppinger Schmidtke

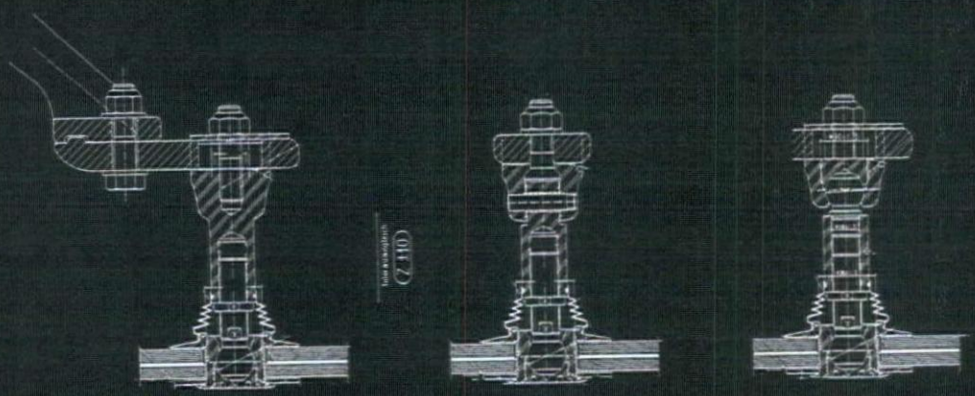
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Concentric arched trusses of end wall.

Exhibition and conference centre, Leipzig, Germany

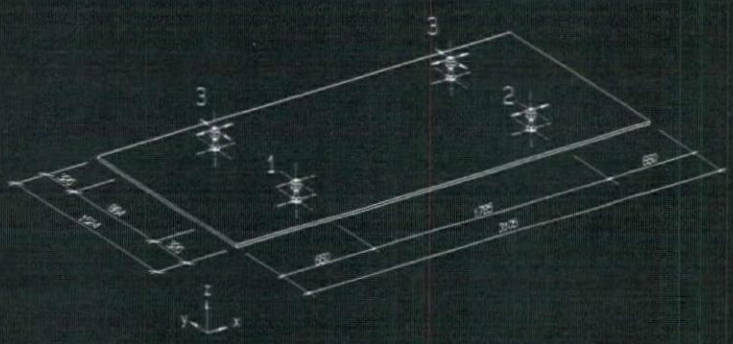
Architect

Von Gerkan, Marg & Partners
Ian Ritchie Architects

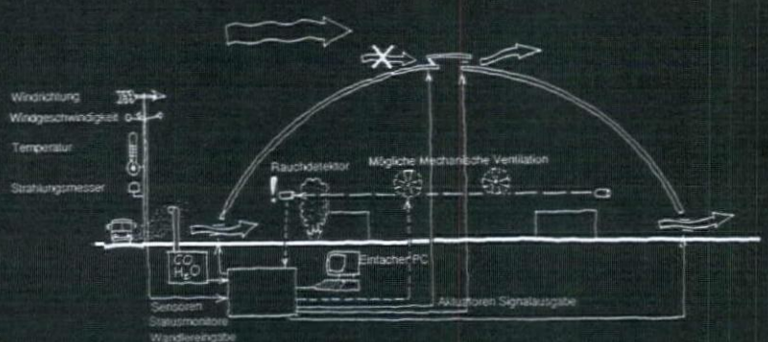
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Different finger joints with spherical bearings ...
10
... which give different degrees of freedom. To minimise transfer of bending stresses to glass, each sheet has one fixed joint (1), one that can move on one axis (2) and two that can move on two axes (3).
11
Climate control system.
12
Summer conditions: assisted natural ventilation with local shade, cooling floor and fritted glass.
13
Winter conditions: convector heating at edges and warm floor keep temperature above 8 degrees Celsius.
14,15
Method of reconciling structural and glass tolerances. During fixing, connecting fingers can rotate round end of cast steel arms and be moved in their own axis and normal to it.



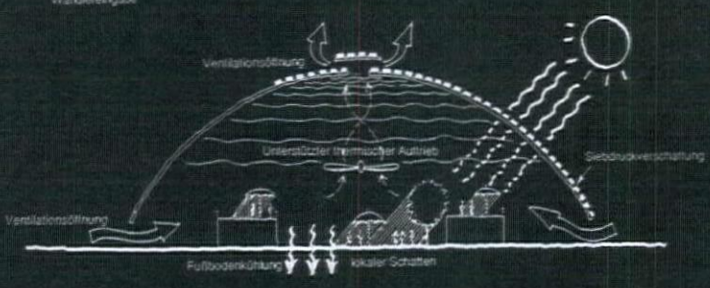
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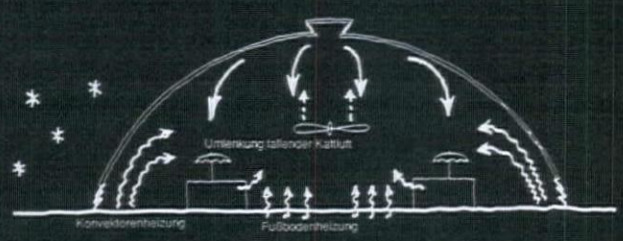
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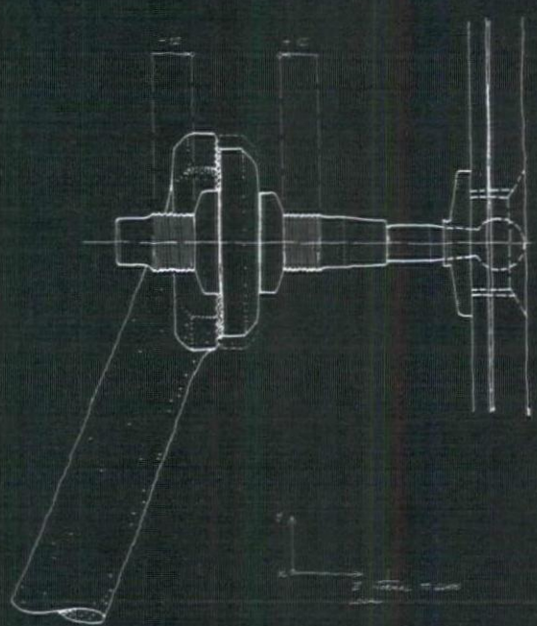
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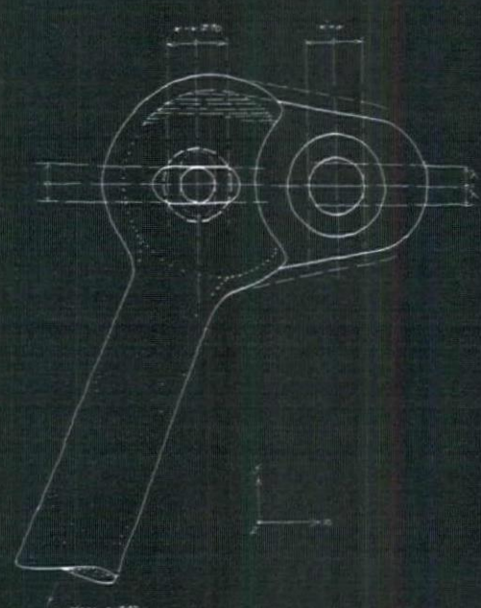
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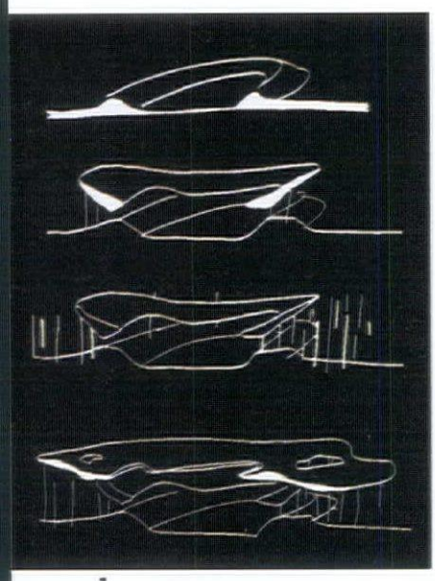
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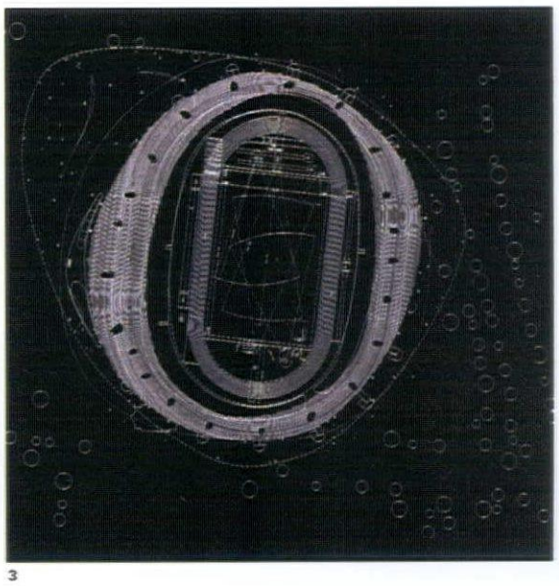
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SPHERICAL INTERLUDES

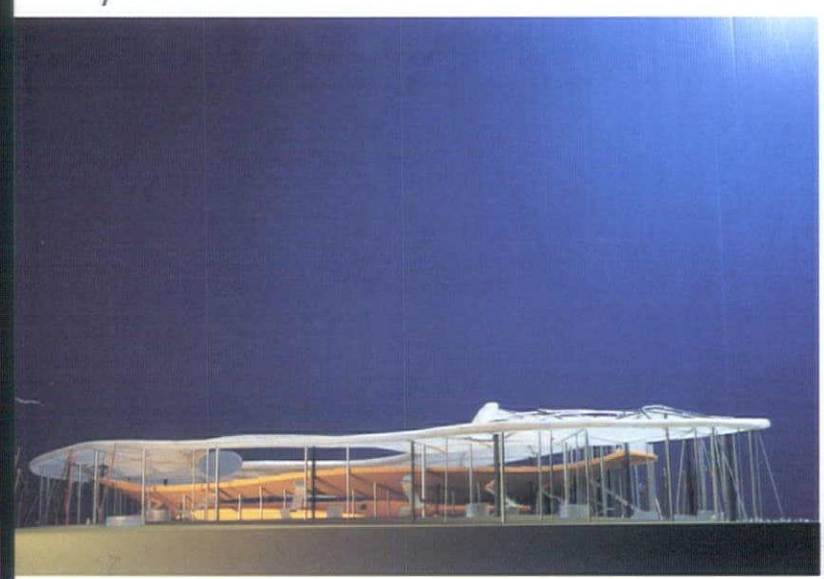
This winning proposal for a new sports arena in Chemnitz rejects traditional fortified stadium typologies in favour of an open, eccentric and highly sculptural complexity.

Sports stadium, Chemnitz, Germany
Architect
Peter Kulka with Ulrich Königs

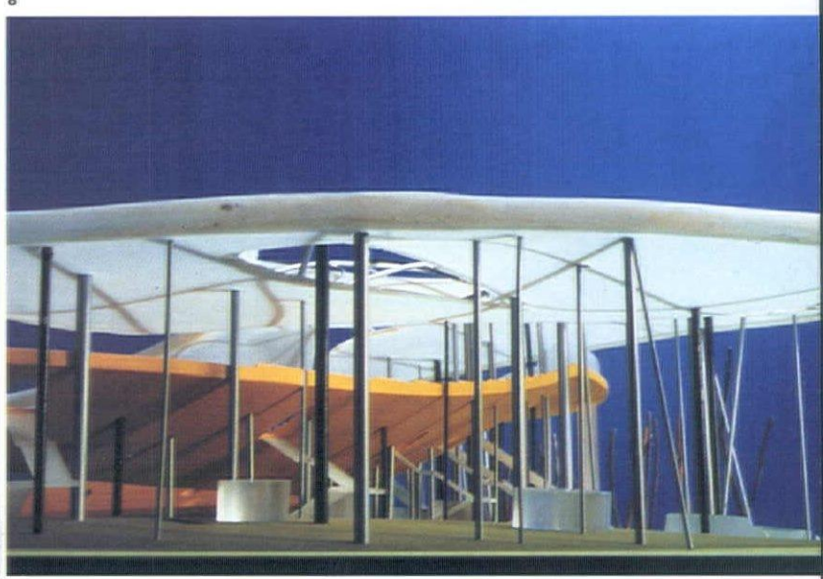
Chemnitz, an industrial city between Leipzig and Dresden, is applying to host the European Athletics Championships in 2002. Four architects were invited by the city to design a 50 000 seat stadium. The jury's verdict was unanimously in favour of the most daring design since Günter Behnisch's 1972 Munich Olympic Stadium. Submitted by Peter Kulka in collaboration with Ulrich Königs, the proposal is a direct riposte to the typology of the Roman amphitheatre. Kulka's design transmutes the legacy of heavy, hierarchical containers for sporting combat, into an open orbit of overlapping spheres, rejecting the current trend of fortifying sports arenas for fear of potential hooliganism. Harmony instead of confrontation underpins the design.

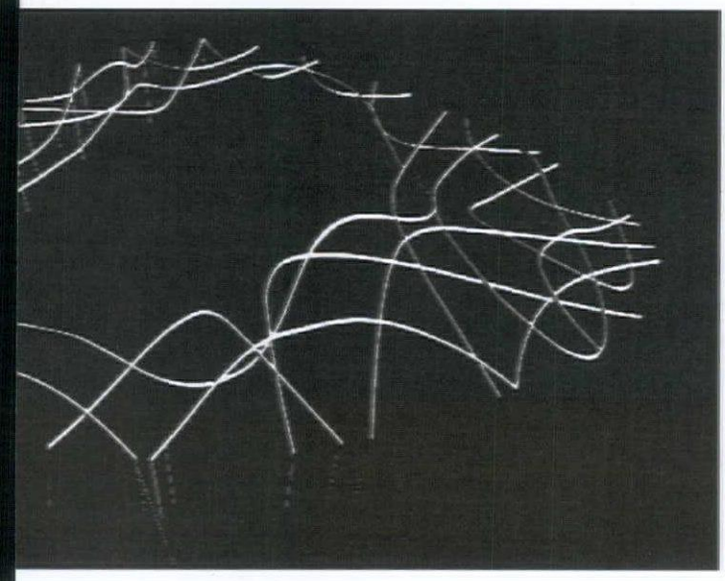
The stadium is a highly sculptural interplay between four main elements: the submerged track and grandstand below ground level, the ring of the grandstand, a forest of columns and, finally, the tensile roof. As soon as spectators enter the grounds through the main northern gate they are protected by the great undulating roof which spans most of the site. The enormous height of the roof, with the irregular pattern of columns and the landscaped grounds, make it difficult to determine the exact borderline between stadium and nature. The fluid shape of the outer roofline and grandstand keep the perimeters deliberately vague, soft and open to interpretation. Lines do not demarcate areas; at best they suggest an activity or simply a behaviour pattern. The result is a random and free play of volumes and materials, mirroring the surge

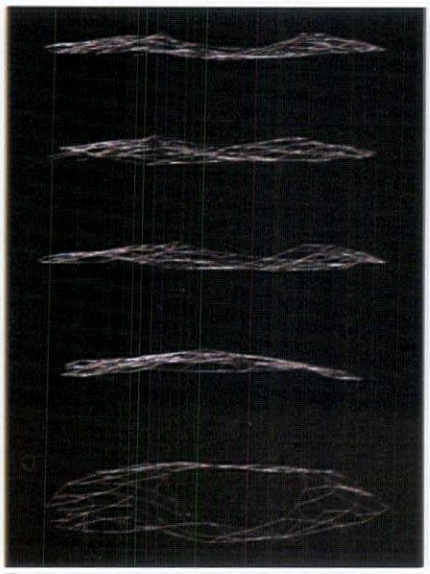
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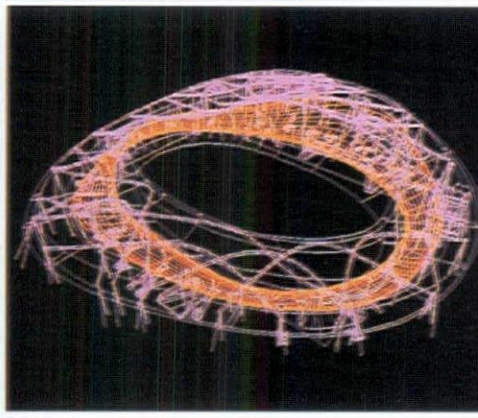
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Architect
Peter Kulka with Ulrich Königs, Dresden/Cologne
Project team
Ilse Kurz, Christoph Schmidt
Structural engineer
Ove Arup & Partners
Computer animation
Schikutski, Computergrafik

of spectators around the grandstand. In effect the spectacle begins long before you reach your seat.

This highly complex swirl of forms, shapes and functions breaks the traditional mould of rigorously concentric stadia. The architectural design attempts to reflect the spontaneous eruption of athletic vitality, and somehow, the engineering had to develop a similar sensibility. Cecil Balmond and Robert Lang from Ove Arup & Partners created a scheme which complemented the seemingly architectural irregularity. The main focus of their attention became the tensile roof, which, according to the architect, should cover the grandstand and entrance like a translucent cloud. This naturalistic impression now had to be engineered.

The dominating feature of the roof is an irregular grid consisting of overlapping rings. To reinforce the impression of an undulating cloud, the roof structure is warped, providing additional stiffness. Each segment of the structural net can be covered or left void. These indefinite patchwork arrangements of the roof segments correspond to the irregular pattern of the forest of columns. The underlying geometry for the apparently random positioning of the roof columns is generated by two grids, one rotated above the other, so that the intersections provide nodes for the column. Each column varies in height, width and, if necessary, cantilevers provide additional support. Variations on this random, informal logic are endless, feeding on its own spontaneity with astonishing results. CHRISTIAN BRENSING

1
Conceptual sketches of the four main elements: hill, floating object, forest of columns and translucent cloud roof.
2, 3
Plan of entrance level, 2, and, 3, upper seating level.
4
Diagram of the primary roof structure of arched members.
5
Sequence of drawings showing the folded roof structure.
6
Composite drawing of roof structure and arena.
7
Elevation of the stadium from the city.
8
Detail of roof over the main entrance, with primary structure showing through the translucent membrane.
9
Perspective of the roof in the main entrance area.
10
Perspective of the inside of the stadium.

9



10

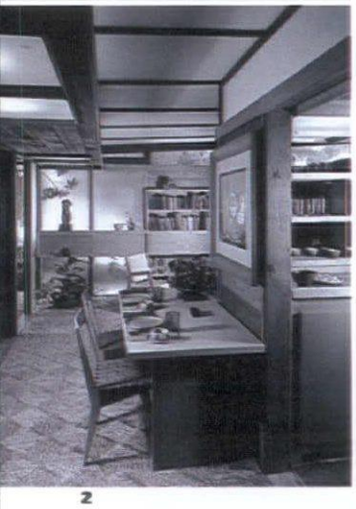


Californian promise

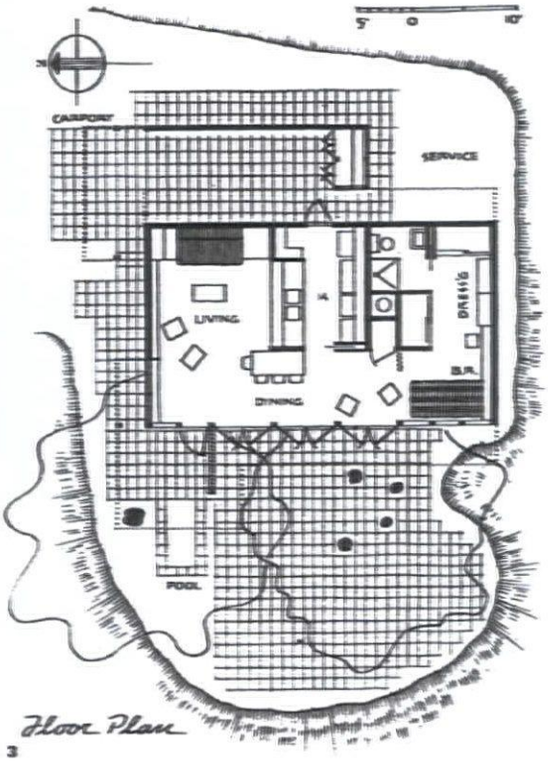
Gordon Drake's marriage of post-war building technology to a lyrical understanding of the Californian landscape held promise that his early death denied. Here, Neil Jackson celebrates Drake's achievement using Julius Shulman's magnificent original photographs.



1



2



3

1
Gordon Drake's own house at Beverly Glen, Los Angeles: a simple, single-room handmade affair in glass and redwood.
2
The redwood frame set up a close and intimate rhythm throughout the Drake House.
3
Drake House plan.
4
The house opened westwards into a sunny bowl carved out of the hillside. Roof beams reach out to hug trees.

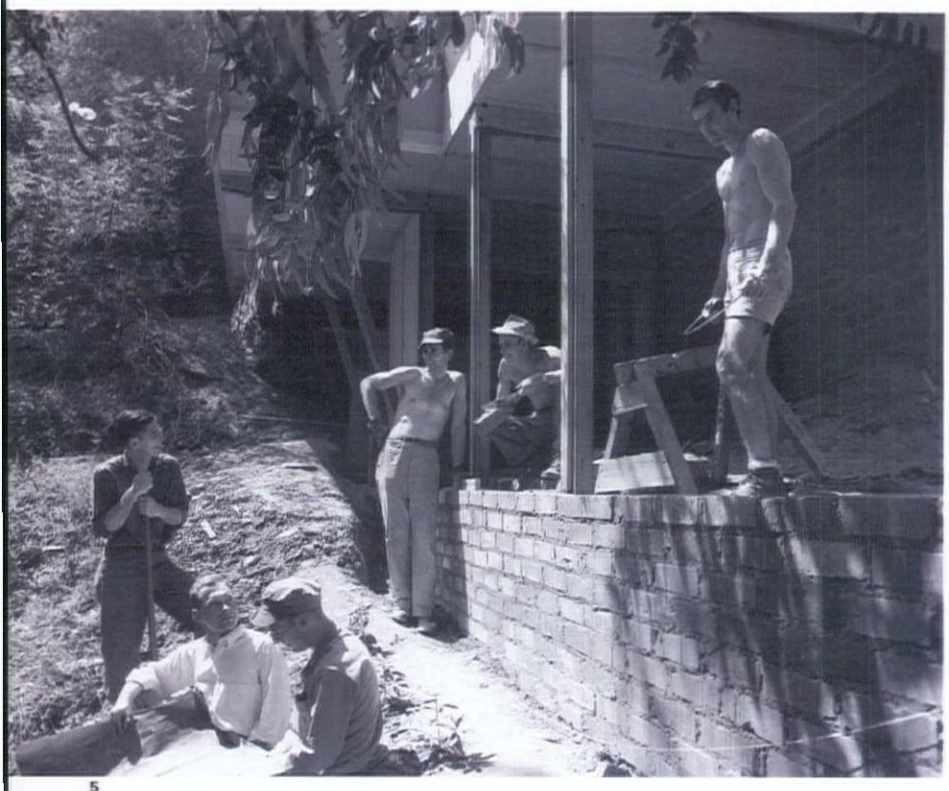
Had Gordon Drake not died aged 35 while skiing in the Sierras in 1952, he might have become one of the great names of post-war Californian architecture. As it was, he had not yet finished taking his California architectural licensing exams. Nevertheless his immediate influence can be recognised in the framed terraces and enclosed garden courts of Craig Ellwood's three Case Study Houses of 1953, '55 and '58, and more recently, a similar use of gridded plans and natural lighting can be identified in Glenn Murcutt's work.

Gordon Drake suffered the mixed blessing of achieving early fame by winning, in 1946, *Progressive Architecture*'s First Annual Award with his very first house and then winning, with his next two buildings, second place in the *House and Gardens* 1947 Awards in Architecture and a Mention in *Progressive Architecture*'s Second Annual Award. His architecture was strongly influenced by Harwell Hamilton Harris who had taught him at the University of Southern California and for whom he had worked before and after the war. It was some indication of Drake's demanding character that Harris later wrote, 'When satisfied there was nothing further to be discovered by continuing a design, he dropped it. Knowing this about him,' he added, 'it is surprising that I let him come to work for me'.[1] In July 1949, frustrated in his own attempts at architecture, Drake had written to Harris: 'It has taken me almost three years to write this letter and perhaps my present low estate was necessary for me to tell you that should I ever arrive at anything of merit in architecture it will be because I was able to work for a time under your guidance.'[2]

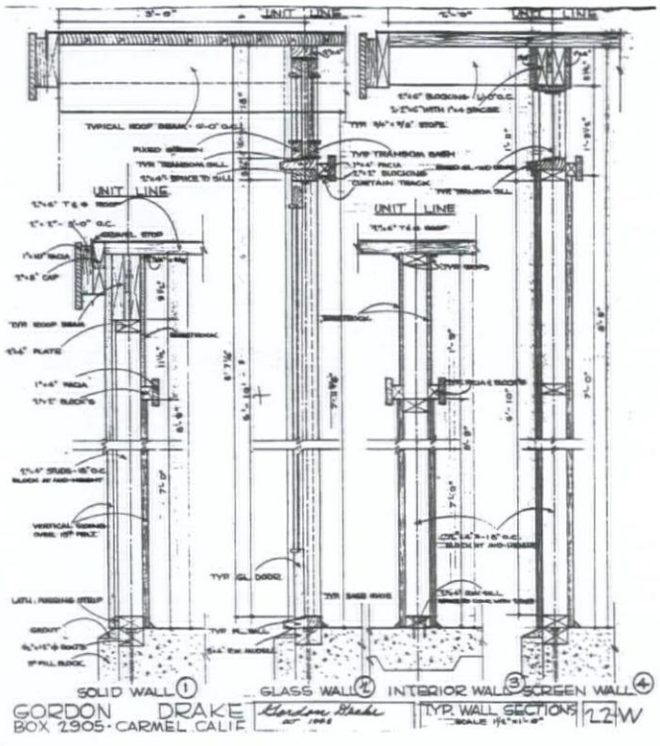
It was from Harris that he had learned the benefits of modular construction and the flexibility of gridded plans. It was not just the simplicity of such systems which appealed to Drake but also what they implied: here was a building process which could provide, at minimum cost, a high-quality living environment – even an egalitarian architecture. This was the intent of his first house, built for himself in Beverly Glen, Los Angeles, and the essence of all his later work.

The Beverly Glen house, judged by William Wurster and Eliel Saarinen to 'best exemplify sound progress in design,'[3] was a simple, single-room, handmade affair in glass and redwood. Arranged on a gridded plan, its long west elevation opened into the warm bowl of a hillside, the roof beams reaching out and hugging the trees which punctuated the brick terrace. Thus despite the restricted, viewless nature of the canyon site, every attempt was made, as *The Architects' Journal* told British readers, 'to do away with any feeling of enclosure or smallness.'[4] Constructed of 100 mm square posts at 1800 mm centres, the redwood frame set up a close and intimate rhythm





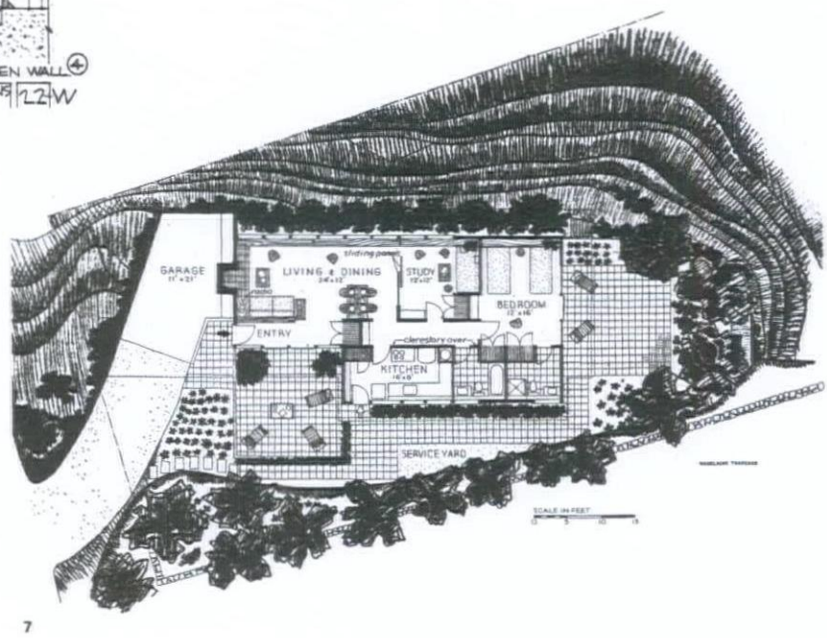
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which was picked up in the repetitive glazed doors and translucent screens of the west elevation and extended across the panelled ceiling to the clerestory lights lining the other walls. Drake had conceived the house while serving in the Pacific as a major in the US Marines and, on coming home, built it with a group of war veterans who, as *Progressive Architecture* noted, 'felt responsible for more than the labor they were performing'.[5] This was the same altruistic intent which John Entenza expressed in promoting *Arts & Architecture*'s contemporary Case Study House program: an attempt to provide well-designed and affordable housing for the post-war years.

Surprisingly, Drake never built a Case Study House. Perhaps he died too soon or was too faithfully wedded to timber, for from 1949 to 1960 the eight Case Study Houses which Entenza published had steel frames. Nevertheless, his David Presley House, built in Silver Lake, Los Angeles in 1946 was as experimental as any Entenza promoted. It was built as a test house for the Home-Ola housing company of Chicago, but the fact that the site was unconventional, steeply sloping and with excellent views, compromised the prototypical nature of the design which was intended for unremarkable, flatland sites. 'The Presleys', Drake wrote to Eleanor Bittermann at *Architectural Forum*, 'are a couple in their mid-twenties and like most young people have never been exposed to work of this spirit ... My work was called to their attention just at the time when the panel system of construction was being investigated. They were told of the nature and risk of the experiment and decided to be the subjects ... Throughout the design and construction they have been most cooperative and now that the house is finished seem very pleased with the finished product'.[6] As with his own house, the Presley house snuggled into the hillside but, with open views to the north, the main living spaces also took advantage of this aspect. Arranged on a 1200 mm grid, the house was constructed of prefabricated stressed-skin plywood panels with doors and windows built in. The simple, monopitch roof allowed for clerestory windows and standardised roof and fascia panels. 'The Presley house,' he explained, 'investigates the feasibility of the



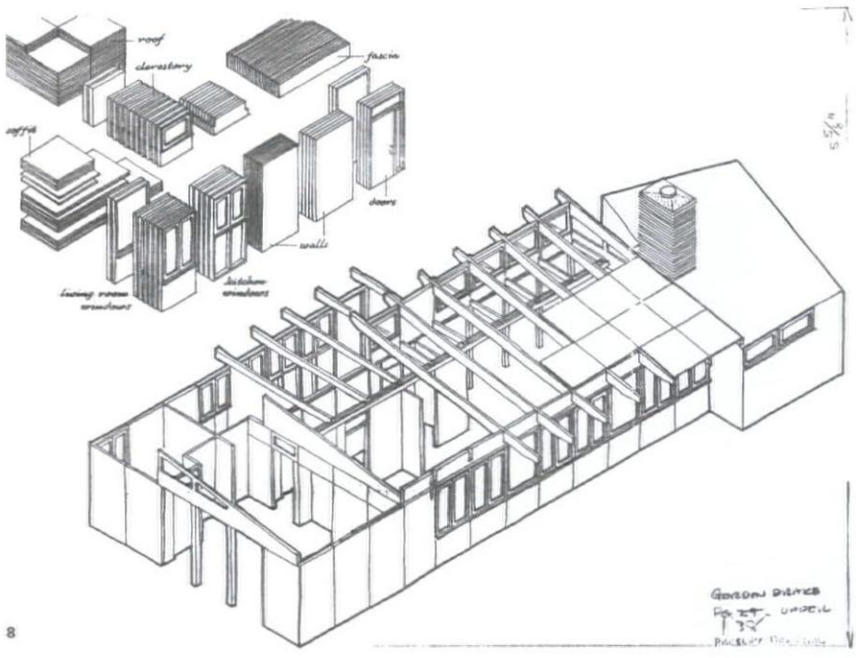
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Drake (left, with shirt) and his ex-Marine building team who 'felt responsible for more than the labor they were performing'. Here, working on the Spillman House.
6
Typical wall sections drawn by Drake for his standardised details.
7
Presley house plan, snuggling into the hillside with open views to the north.

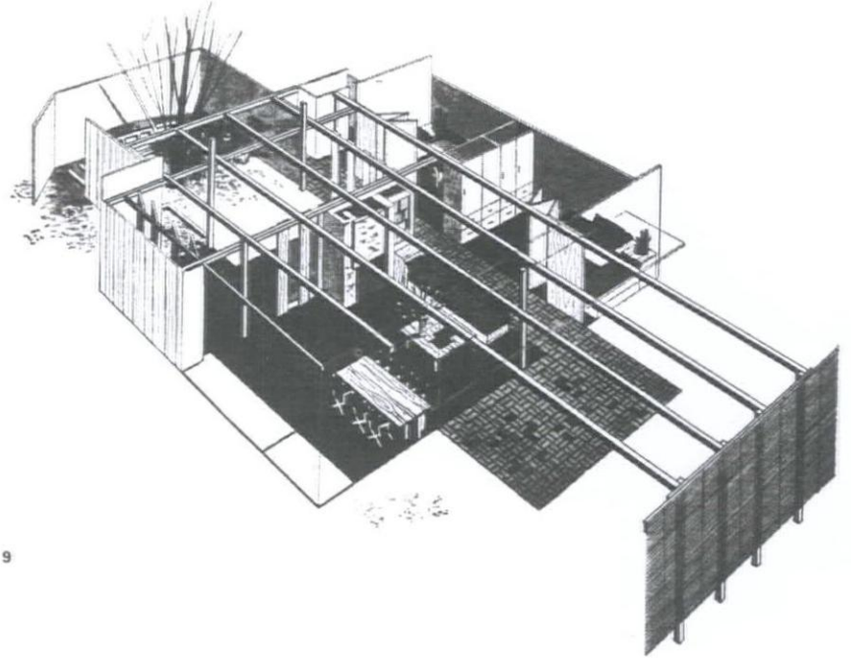
system of construction and stays within the limits of the basic scheme as much as the site and the client's needs would allow. It cannot be compared to either a custom designed house or to one that has reached the simplification of mass production. I feel it is a compromise to both; a compromise that will be justified by the revised sceme [*sic*] that suits the needs of an average unknown client on a site devoid of either grade or view.'[7]

In his attempt to design for the average unknown client, Drake left Los Angeles in early 1948. 'I must go up to Carmel,' he wrote, 'and build a professional building that expresses what I believe in. This must be built with my own hands as an expression of faith.'[8] His idea was to open a professional office which was also a graduate school and research centre, similar to Christopher Alexander's forum at the Center for Environmental Structure at Martinez, California. Its interests were not limited to architecture, but would encompass planning, landscape and other disciplines. But most importantly, the office would serve the community. As Drake said, 'Through research arrive at honest planning. Build. Evaluate. Give these ideas and developments to the community as they desire them. Create that desire.'[9]

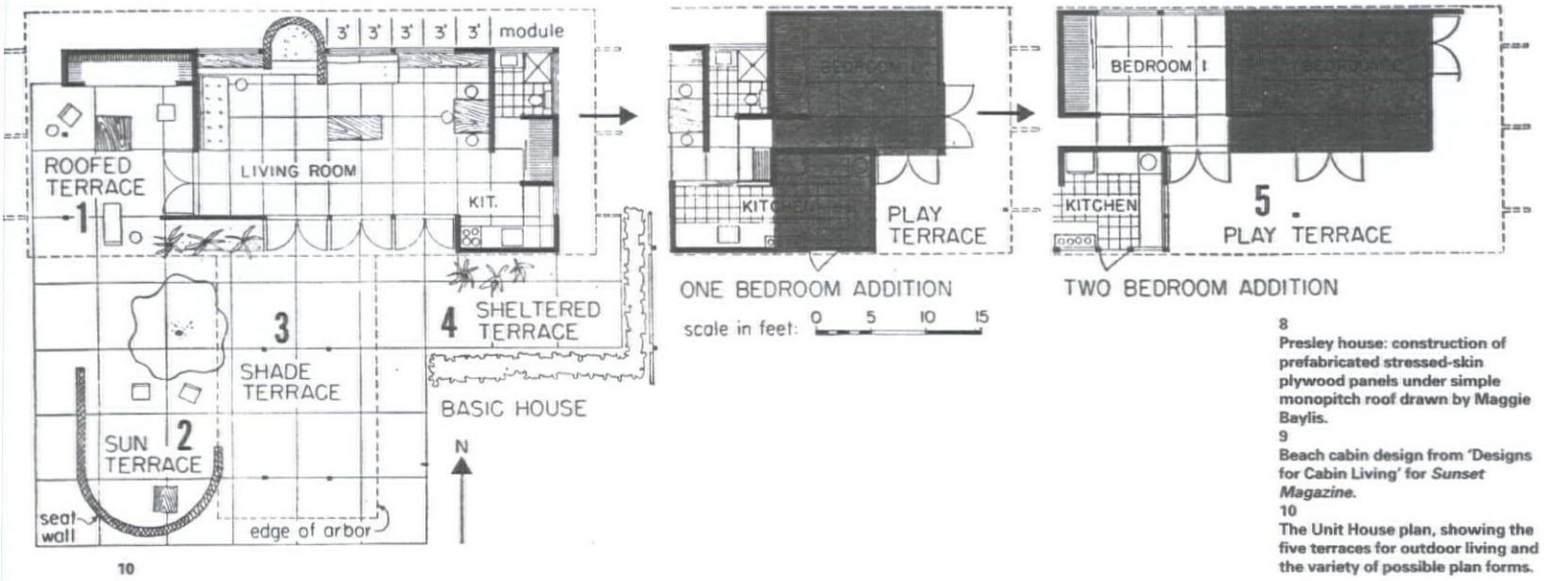
The result was two houses, one a vacation home for Edward Kennedy, publisher of *The Monterey Peninsula Herald* and the other a speculative design called the Mesa House. Both houses brought the design and social philosophy of his Los Angeles houses to northern California. The first was set into a hillside with trellised courts and roof decks extending the living spaces into the landscape providing 'as much individual choice (sun or shade; openness or intimacy; view or enclosure) as possible.'[10] The objective of the other, with its enclosed garden courts opening off each living and bed-room, was 'to give the maximum indoor and outdoor living space under the restriction of a small lot.'[11] Modular and inexpensive, built of stock pieces and supported by a lengthy series of standardised details and specifications which Drake had prepared on sheets of 300 x 300 mm tracing paper, the concept was well suited to the speculative market but the market was not ready.



8



9



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8
Presley house: construction of prefabricated stressed-skin plywood panels under simple monopitch roof drawn by Maggie Baylis.
9
Beach cabin design from 'Designs for Cabin Living' for *Sunset Magazine*.
10
The Unit House plan, showing the five terraces for outdoor living and the variety of possible plan forms.



11



12



13

11
Esther Tobey (who wrote on architecture as Esther McCoy) sitting on the seafront terrace of the Berns House.
12
Berns House from Malibu beach.
13
Berns House, inner court with 75x200 mm beams and screen-cloth.

The commissions for the other houses Drake had hoped to build never materialised so in the autumn of 1949 he went on up to San Francisco to share an office with the landscape architect Douglas Baylis who had worked with him on the Mesa House. Here he continued to explore ways of working with architecture and landscape, many ideas being published in *Sunset, the Magazine of Western Living*. Under Walter Doty's editorship the emphasis of the magazine was, as it still is, on living with nature. Between articles on travel, food and gardening, *Sunset* showed buildings by Harwell Hamilton Harris, William Wurster, John Lautner and Pietro Belluschi, as well as making much use of landscape architects like Tommy Church, Garret Eckbo and Drake's friend Douglas Baylis. It was through these designs, often published anonymously, that Drake finally reached the average unknown client. For the vacationing Californian he drew 'Designs for cabin living',[12] flexible and inexpensive schemes for beach, riverside and mountain sites. For those who remained at home he provided 'Good ideas for your garden dining room'[13] and showed 'How tomorrow's Western kitchens will extend to the out-of-doors.'[14] He even published ideas for modular screens with which 'you can build almost any garden structure.'[15] And then at the end of 1951 Drake moved into Lawrence Halprin's landscape office.

Gordon Drake completed his last two buildings in 1951. The Unit House, designed with Douglas Baylis and built in the East Bay near Oakland, was a combination of his own first house and the river cabin he designed for *Sunset*: a simple, almost single-cell building, based upon a 1800 mm grid with the possibility, as its name suggested, of modular expansion. As if conceived for *Sunset* readers, it was a very Californian house, offering a series of five terrace spaces for outdoor living – sunny, shaded, sheltered, roofed and, for the kids, supervised. Redwood gave it warmth and clerestory and gable lights softened its lines.

These techniques were used again at the Robert S Berns House at Malibu, where a variety of terraced spaces combined to form a gentle and progressive entrance sequence, and the glare of the ocean was softened by screens of stretched muslin, burlap and rice paper. When Drake's friend Julius Shulman photographed the house in 1953, he caught Esther McCoy, who was to write so much about modern Californian architecture, sitting on the seafront terrace.

Early the next year Drake took a few days' holiday to go skiing near Lake Tahoe with a New Zealand architect, Warren Radcliff, and another friend, Betsy Roeth, whom he might have married had he lived longer. On 15 January he went out on his own after a heavy lunch and, not being a very good skier, fell heavily in the fresh snow and, vomiting, choked to death. In his wallet was a half-sheet of writing paper with a few pencilled lines copied from John Donne's *Devotions*.[16] 'No man is an island, entire of it self;' he had written, 'Every man is a peace of the continent, a part of the main.'[17] The quotation continued with words which could have been his epitaph: 'Any man's death diminishes me, because I am involved in mankind.'

NEIL JACKSON

1 Douglas Baylis, *California Houses of Gordon Drake*, New York, 1956, p83.
2 Gordon Drake to Harwell Hamilton Harris, 29 July 1949. Letter in possession of Maggie Baylis.
3 'USA Architectural Awards', *The Architects' Journal*, 12 June 1947, p496.
4 'Minimum House', *The Architects' Journal*, 10 July 1947 p36.
5 *Progressive Architecture*, July 1947, p14.
6 Gordon Drake to Eleanor Bittermann, 9 July 1947. Letter in possession of Maggie Baylis.
7 *Ibid.*
8 Douglas Baylis, *op cit.*
9 *Ibid.*
10 'House: Carmel, California'. *Progressive Architecture*, February 1952, p93.
11 'In search of a plan for the Western home, *Sunset Magazine*, October 1949, p31.
12 'Designs for Cabin Living', *Sunset Magazine*, July 1950, pp30-33.
13 *Sunset Magazine*, July 1951, pp36-38.
14 *Sunset Magazine*, November 1951, pp34-39.
15 *Sunset Magazine*, March 1951, pp40-44.
16 Paper in possession of Maggie Baylis.
17 The spelling is Drake's.

All photographs by Julius Shulman

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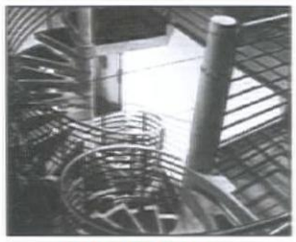
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Spiral Construction is one of the leading manufacturers of spiral staircases. The company offers a free design service on all its products. Full drawings are available if required. Close liaison with architects and engineers ensures the smallest details are carefully and accurately planned. The company is also able to develop clients' design concepts into practical cost effective situations.

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CORNWALL TR12 6PE
TEL: (01326) 280002 FAX: (01326) 280002

CONCRETE



STEEL



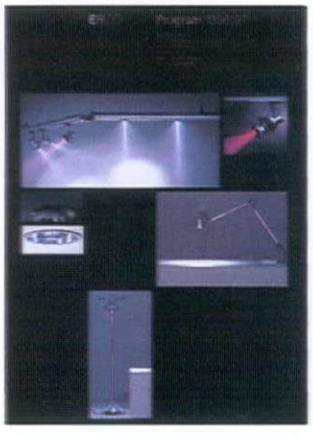
TIMBER





For more details enter 17 on AR enquiry card

Specifier's information

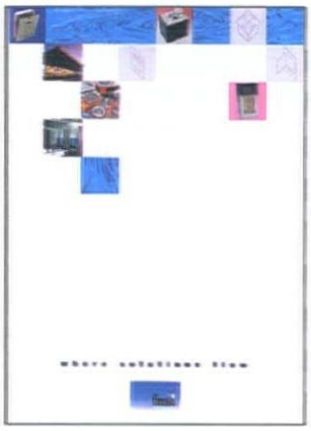


ERCO Lighting Limited New Program 1996/97

ERCO's new Program 1996/97 contains a wealth of new products and unique developments to existing product ranges. The additional 45 pages makes a total of 417 pages. The variety of new ranges included are the Opton, Lucy, Zenit, CL-C and Pollux. Completely new spotlight and downlight ranges launched by ERCO for 1996 are also in the Program 1996/97.

ERCO Lighting Ltd,
38 Dover Street, London W1X 3RB
Tel: 0171 408 0320 Fax: 0171 409 1530

900 on AR enquiry card



Where Solutions Flow

A new Corporate Brochure from F C Frost Ltd which demonstrates a quarter of a century of expertise in design, manufacture and supply of architectural and drainage products for building projects worldwide is now available.

The new brochure coincides with Frost's 25th Anniversary and shows their latest advanced product range, including access doors, warm air hand dryers, drinking fountains, disposal units for sanitary products, electronic hands-free soap dispensers, floor channels and gratings, floor drains, roof drains and a whole lot more.

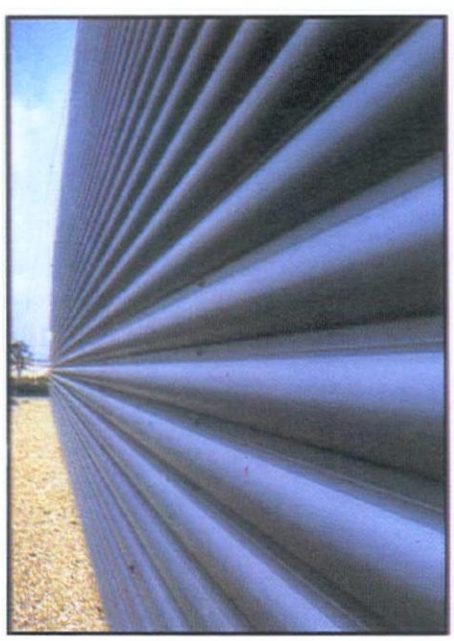
The Company's maxim is "Clients specify needs, Frost provide solutions" and this is clearly illustrated in this informative new publication.

F.C. Frost Limited
Bankside Works, Bernfield Way, Braintree,
Essex CM7 6YS
Tel: (01376) 329111 Fax: (01376) 347002

901 on AR enquiry card

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All profiles are NOT the same...



The unique AP50HR profile – perfection with economy in 29 colours and 3 PVF2 coating systems – all from The Style Setters,

Architectural Profiles Ltd.

Ask for details 01453 756550



Peel Park Campus, East Kilbride, Scotland. Architects: East Kilbride Development Corporation. Max unit size 2.4m high by 2.0m wide. (This unit will carry a maximum wind load of 2900N/m²)

High performance Planarclad from Pilkington Architectural

BEHIND THE SEEN

One of the first things you notice about a building glazed with Planarclad is not what it reveals, but what it reflects.

That's because Planarclad puts the outside inside, using *internal* aluminium supporting sections, with proven Planar fittings for high structural integrity.



Planarclad presents more than a beautifully sheer face to the world; it gives exterior walls ease of maintenance, with consequent low maintenance costs.

This highly innovative and cost effective system is easy to install, and has long life and durability (this having been independently tested at the Construction Research Laboratories in Miami).

Planarclad provides exceedingly low thermal transmission, and offers full environmental control with specialist Pilkington glasses.

It also ensures excellent acoustic insulation; allows for natural ventilation, employing opening lights; and is assured by a 12 year Pilkington Glass design and performance warranty.

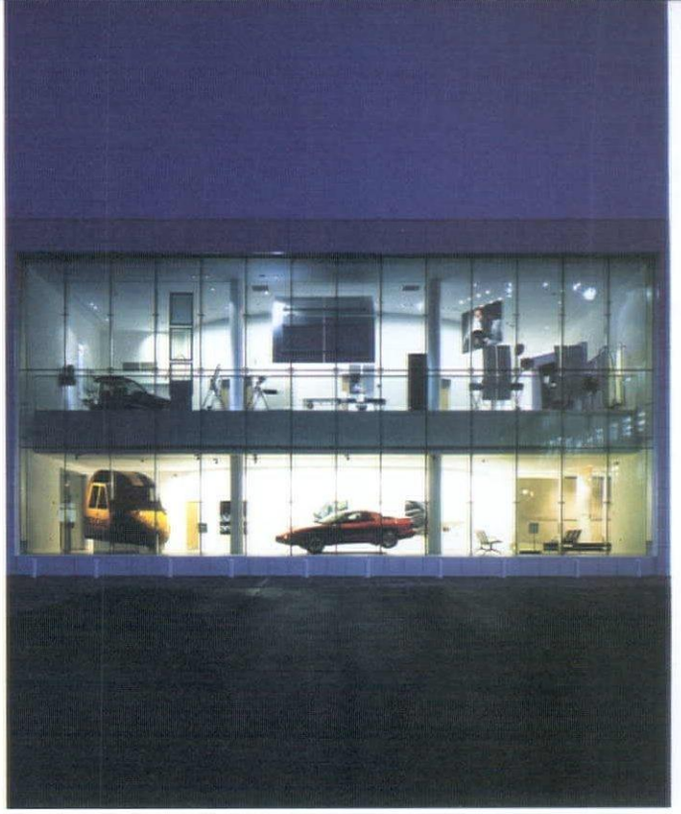
To see even more behind this remarkable system, write for our literature to Pilkington Glass Limited, Publicity Department, FREEPOST, St Helens, Merseyside WA10 5BR.

PILKINGTO
GLASS PRODUCT

For more details enter 18 on AR enquiry card

PS PRODUCTS SURVEY

External envelope



501 Pilkington's exhibition centre at Lathom, Lancashire

501
Pilkington's exhibition centre at Lathom, Lancashire shows the latest in glass technology in both exhibits and building: a two-storey former office building refurbished by RMJM. The new south facade is glazed in Planar structural glazing. The double-glazed units have a 10 mm toughened outer leaf of Antisun glass, a 16 mm cavity and 6 mm toughened inner leaf of Pilkington K glass, braced on the inside with 19 mm toughened glass fins. Photograph: Chris Gascoigne

Pilkington Glass, Prescot Rd, St Helens, Lancashire, WA10 3TT. Tel: +44 744 2354. Fax: +44 744 69 2478

502
Dominique Perrault, architect of the Bibliothèque Nationale de France, with Saint-Gobain, developed Securiflam extra-clear laminated fire safety glass for the four 22-storey towers. The firm's float-works produced glass which was made into double-glazed units with an air cavity between 12 mm laminated outer panes and 20 mm laminated inner ones of 30 minute fire-rated Securiflam. The glazing admits only yellow light, reducing daylight fading of interior fittings.

Saint-Gobain Glass UK, 19 Dunraven St, London W1Y 4JR. Tel: +44 171 468 1300. Fax: +44 171 499 6269

503
Kal-Zip, the aluminium standing seam roofing system made by Hoogovens Aluminium Building Systems, was specified by ABK with Buro Happold, in the transformation of a run-down engineering works in Cardiff Bay into a science centre. The original wrought-iron framework was renovated and supports the Kal-Zip roof. The roof sandwich, with inner layers of Rockwool insulation and Monorflex Reflex 275 vapour control, has an outer layer of curved metal sheets over 18 m long.

Hoogovens Aluminium Building Systems, Haydock Lane, Haydock, St Helens, Merseyside WA11 9TY. Tel: +44 1942 272152

504
For the city hall and library in The Hague by Richard Meier, Gartner's supplied 60 000 m² of aluminium curtain walling, ribbon windows, aluminium spandrel panels, and power driven sunblinds. They also provided staircase facade and atrium, and entrance screen. Powder coating is RAL 9010.

Josef Gartner, Werkstätten für Stahl- und Metalkonstruktionen, Postfach 20/40, 89421 Gundelfingen, Germany. Tel: +49 90 73 84 0. Fax: +49 90 73 84 21 00



502 Bibliothèque Nationale de France. Glass cladding by Saint-Gobain



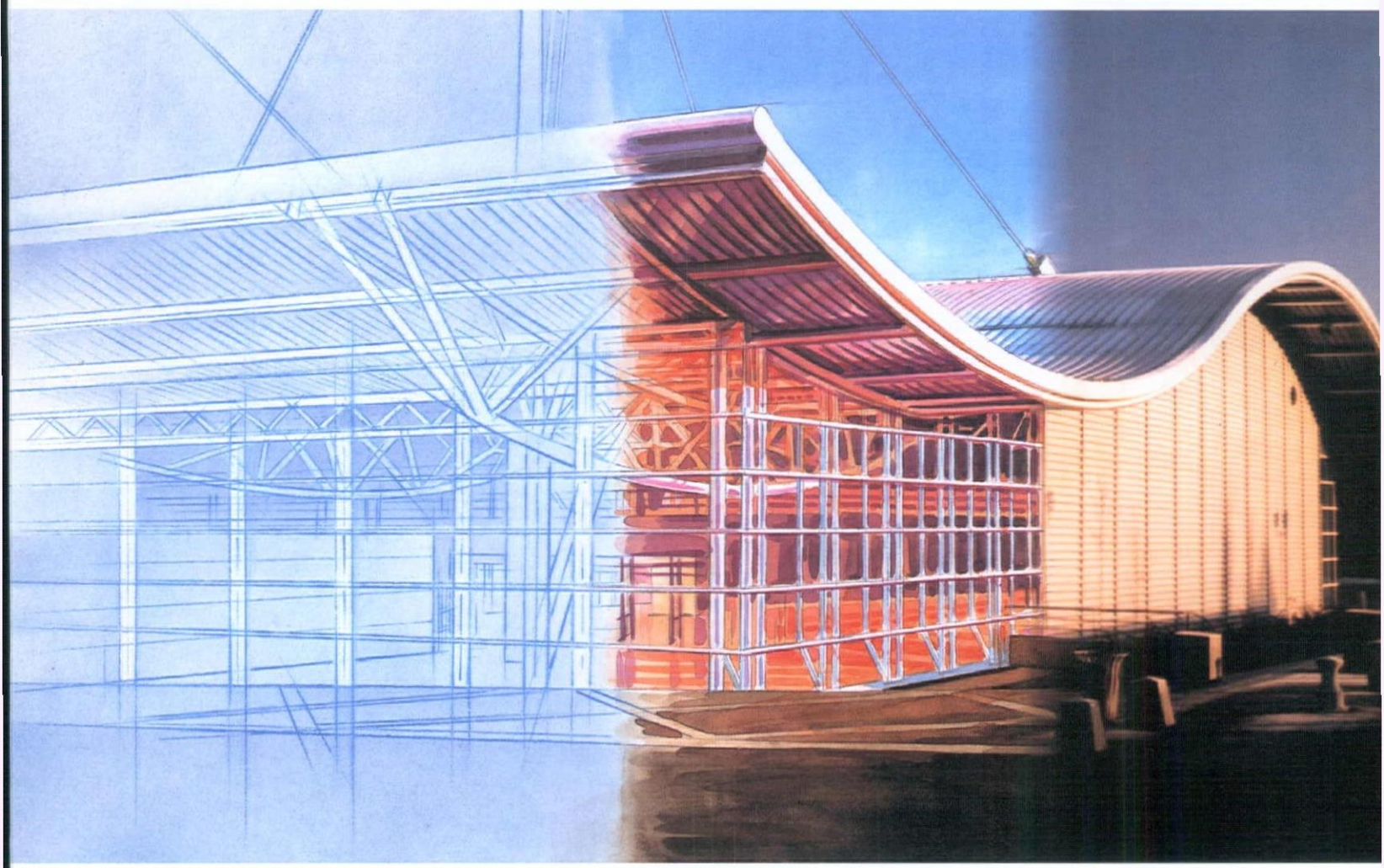
503 Kal-Zip aluminium standing seam roofing at Cardiff Bay



504 Josef Gartner steel and metal construction in The Hague

If you would like to obtain more information on these products, please enter the relevant numbers (**501** etc) on the reader enquiry card at the front of this issue.

WHo supplies the KAL-SYSTEM from concept to completion - and beyond?



WHo else but Hoogovens

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WHo has over 40 years' design, technical and manufacturing KAL-EXPERIENCE?

WHo has over 25 years' independent documented evidence on KAL-ALLOY® durability?

WHo trains their national TEAM-KAL™ network of over 50 installation experts?

WHo has in excess of 30 million square metres of KAL-ZIP® roofing installed worldwide?

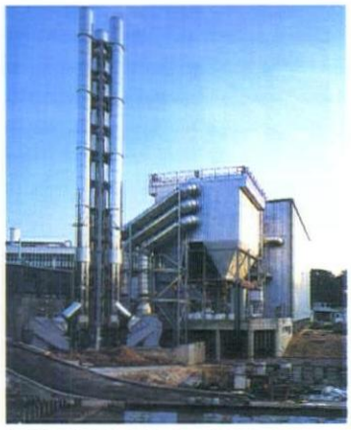
WHo? Hoogovens of course, Europe's largest bi-metal producer.

Hoogovens Aluminium Building Systems

Hoogovens Aluminium Building Systems Ltd
Haydock Lane, Haydock, St. Helens
Merseyside WA11 9TY
Telephone: Customer Service (01942) 272152
Facsimile: (01942) 272136

London Office:
The Business Design Centre, 52 Upper Street
Islington Green, London N1 0QH
Telephone: (0171) 354 3838
Facsimile: (0171) 354 8788

For more details enter 19 on AR enquiry card



505 British Steel at BRE, Garston

505
The Fire Research Station's new laboratories at the Building Research Establishment, Garston, include the Burn Hall by Paul Hyett Architects. The hall provides the latest technology and resources for experimental fire research under safe and environmentally acceptable conditions. The main hall is a double-cube volume, enclosed by a steel portal frame clad on both sides with British Steel's profiled metal sheet. External cladding is vertical trapezoidal-profiled steel sheet, the pre-finished steel coloured metallic silver.

British Steel UK
Tel: +44 1633 222211
Fax: +44 1633 222288

506
Solaglas installed the 42 m long double-glazed glass floor on the ground floor of the Law Faculty Building, designed by Sir Norman Foster & Partners for Cambridge University. The floor allows daylight, entering through the building's curved glass shell, into communal areas on the lower ground floor. It incorporates fire-rated 27 mm glass for safety and 25 mm annealed glass for rigidity, with support from structural members. Solaglas also installed overhead glazing in common rooms and partitions of Solaglas FireMaster 90 glass.

Solaglas, UK
Tel: +44 1203 458844
Fax: +44 1203 636473

507, 508
The international competition to build the Leipzig Trade Fair was won in 1992 by von Gerkan, Marg & Partners who asked Ian Ritchie Architects to collaborate on the design of the central glass hall. Its great arched roof, spanning 79 m, is 243.75 long and 28 m high, and shows new ways of dealing with glass. In its design, the architects worked closely with Seele's engineers. With Mero **(507)** being responsible for the external steelwork, Seele **(508)** constructed the transparent skin of laminated glass sheets suspended from the steelwork by cast steel arms. The firm works closely with architects in developing new structures, and supplies glass and steel systems for facades and roofs.

Seele, Germany
Tel: +49 821 24 94 0
Fax: +49 821 24 94 100

Mero, Germany
Tel: +49 931 66 70 5 40
Fax: +49 931 66 70 5 47

509
A light fabric membrane from Tensoforma shelters archaeological excavation of an ancient synagogue at Ein Gedi by the Dead Sea in Israel. The membrane is designed to resist the impact of the sun's ultra violet rays, as well as protecting the site from the weather and providing shade for visitors. The structure covering about 550 m², consists of the coated, fireproof, polyester canopy, 30 m high and 34 m long, supported by four masts and braced by steel cabling. The firm specialises in supplying and developing tensile structures, and will manufacture special structures to order.

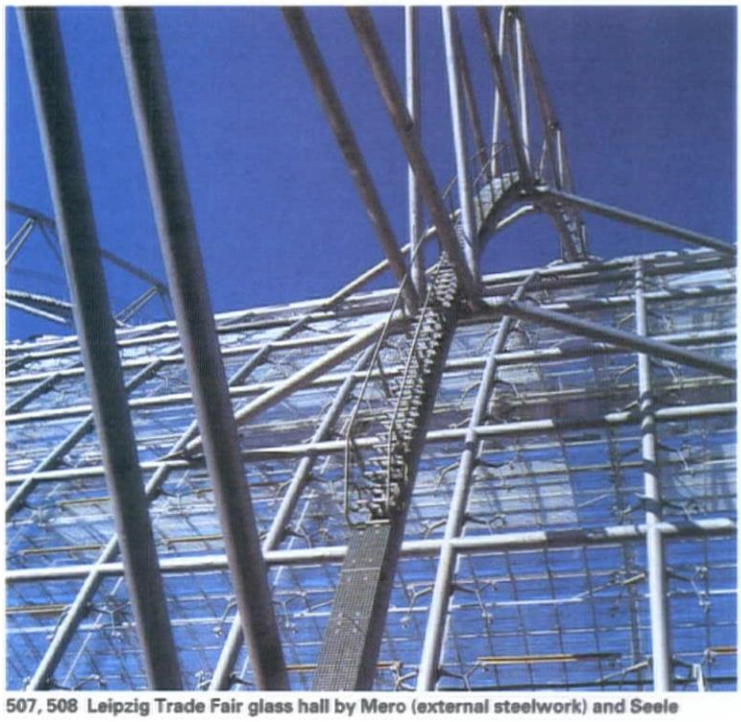
Tensoforma, Italy
Tel: +39 35 21 31 35.
Fax: +39 35 24 08 68

If you would like to obtain more information on these products, please enter the relevant numbers (**501** etc) on the reader enquiry card at the front of this issue.

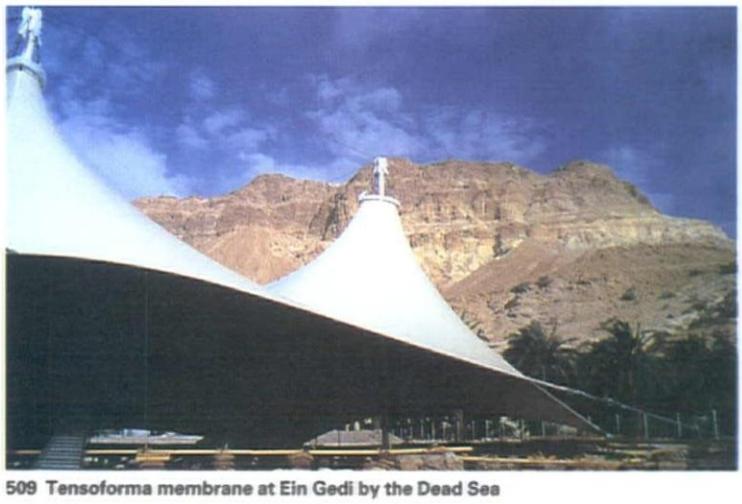


Photograph by Dennis Gilbert

506 Law Faculty Building, Cambridge glazed by Solaglas



507, 508 Leipzig Trade Fair glass hall by Mero (external steelwork) and Seele



509 Tensoforma membrane at Ein Gedi by the Dead Sea

Prince on Schedule at Gatwick



Airside Expansion completed on time

Prince Cladding have recently completed the Airside Expansion at the Gatwick South Terminal, a total of 5000m². The contract was for the design, supply and installation of bespoke curtain wall facade, with facade elements of panels, glass, ventilators and louvres.

This prestigious project required the facade to comply with several critical constraints; which included 'Fastrack' weathered facade, floor heights in excess of 7 metres, severe exposed location, differential floor movements ± 20mm and high sound reduction at low frequencies. These constraints were achieved by incorporating vertical secondary steelwork within an aluminium thermally broken curtain wall carrier system, incorporating dual weathering barriers of EPDM gaskets.

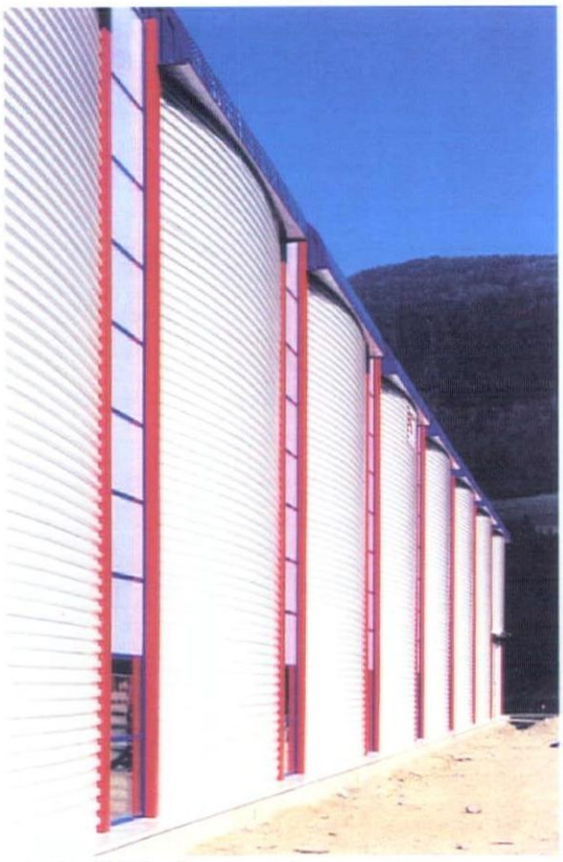
The initial weathering and sound reduction was provided utilising a metal composite panel, glazed into the curtain wall carrier, comprising high density Rockwool and plasterboard.

Glazed areas incorporated either 29.4mm double glazing units or double windows within the CIP area.

prince

For further information contact:
PRINCE CLADDING AND CONSTRUCTION LTD.
Northgate Works, Stanley Lane, Bridgnorth
Shropshire WV16 4SF
Tel: 01746 767101 Fax: 01746 767104

For more details enter 20 on AR enquiry card



510 Ward Building Components for Zeman & Co



511 Trespa Meteon panels at the Maison Bleue in Paris

510

Curved profiled steel sheeting, available from Ward Building Components, can be used for roofing or cladding. The sheet-bending technology and software was developed by Zeman & Co of Austria and Ward is licensed to produce it in the UK. Already finished, trapezoidal profile roof sheets are fed between sets of rollers and bent to a radius that can be altered during bending.

Zeman & Co, Austria
Tel: +43 222 814 140
Fax: +43 222 812 27 13

Ward Building Components, UK
Tel: +44 1944 710591

511

The Maison Bleue in Paris, by Cabinet G2A Conception, is an apartment and office block. It is clad in Trespa Meteon panels. Invisibly fixed to an aluminium substructure, the pure white panels are smoothly finished, durable and easy to maintain. Trespa is a division of the Dutch group, Hoechst, specialising in a range of quality cladding panels.

Trespa UK Ltd
Tel: +44 1952 290-707
Fax: +44 1952 290-101

512

Siemens' daylight systems are said to combine the highest possible light transmission with effective sun shields. Richard Rogers Partnership specified Siemens' systems in their scheme for Billingsgate Fish Market in London. Light is diffused through toplights with single or dual prismatic panels between double glazing.

Siemens, Germany
Tel: +49 86 69 33 591
Fax: +49 86 69 3 66 443

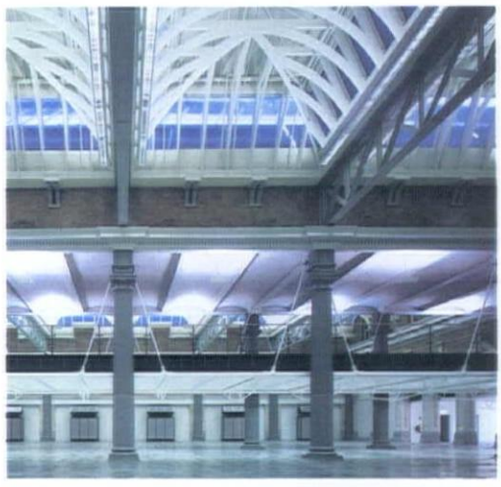
513

Schüco's System Facade VEC was specified for the structural glazing of the Cergy-Pontoise University building, designed by Guy Autran, on the outskirts of Paris. The system was originally developed for the French market.

Schüco International Germany
Tel: +49 521 783 420
Fax: +49 521 783 182

Schüco UK
Tel: +44 1908 282 111
Fax: +44 1908 282 124

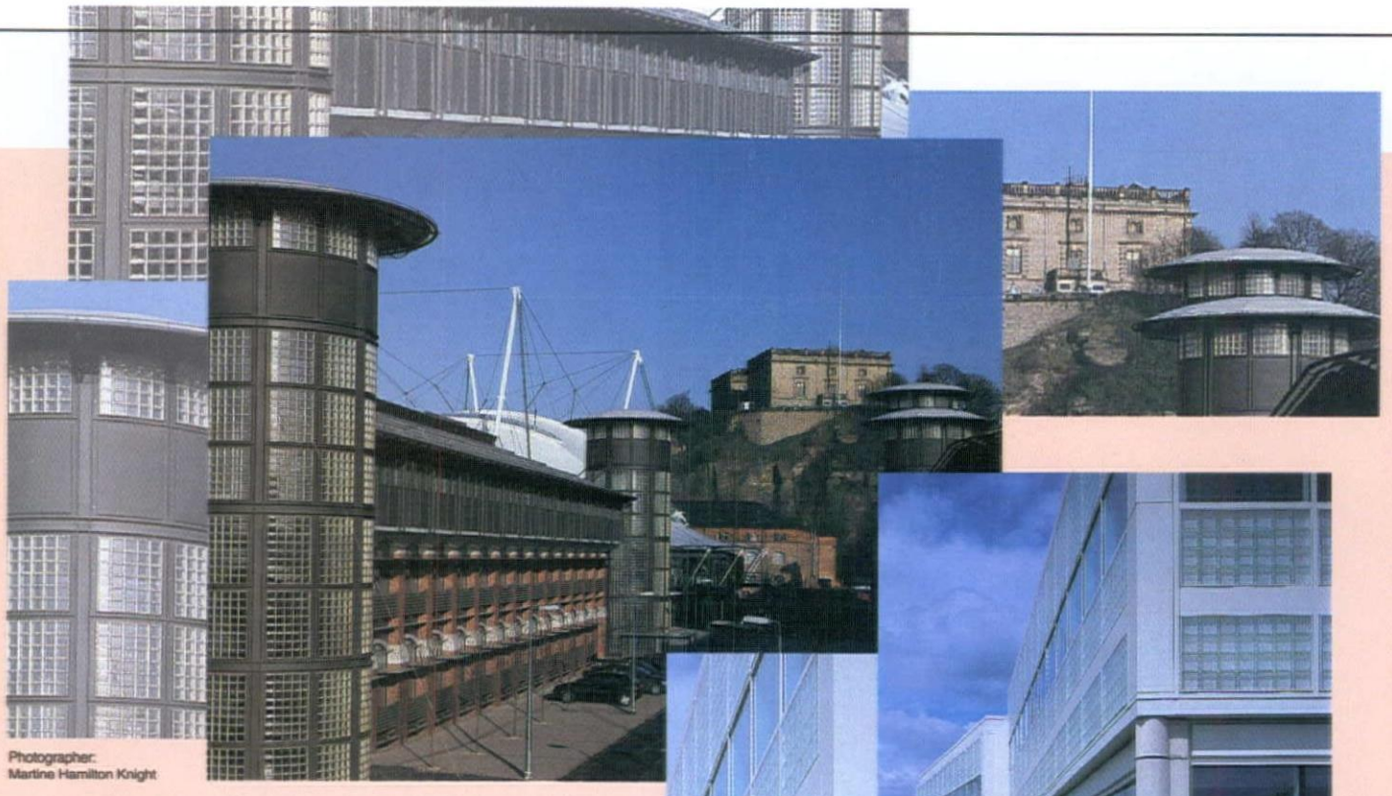
If you would like to obtain more information on these products, please enter the relevant numbers (**501** etc.) on the reader enquiry card at the front of this issue.



512 Siemens' daylight systems at Billingsgate, London



513 Schüco's System Facade VEC at Cergy-Pontoise University



Photographer:
Martine Hamilton Knight

Project ~ Inland Revenue Offices, Nottingham, England
Architect ~ Michael Hopkins & Partners
VUE® Pattern

Project ~ Stockley Park, London, England
Architect ~ EP Associates Ltd. Architects
VUE® Pattern and VUE® Pattern with "LX" Fibrous Glass Insert

Photographer:
Martin Charles

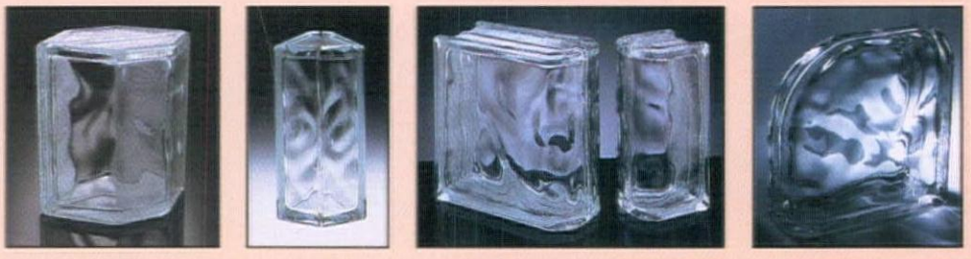
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Fax: 44-734-509019

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For more details enter 9 on AR enquiry card



514 AME-Euro at Salford

514
Working closely with the cladding manufacturer AME-Euro, architects Hodder Associates were able to make the most of the flexibility of the firm's cladding system. This was specified for the complex modular cladding of the facade of the new High Technology Centre at Salford University in Greater Manchester. Manufactured from Silver Matt G3 stainless steel, the system includes many innovative details designed for this particular project.
AME-Euro specialises in the design and manufacture of high quality, modular panel systems suitable for a great variety of buildings and sites. The various elements of the systems, such as the panels, windows and louvres, are created as modular units to ensure flexibility.

AME-Euro, UK
Tel: +44 1695 50658
Fax: +44 1695 50652

515
Superform Metals' cladding panels in 14 different sizes were used in the construction of Charléty Stadium in Paris, designed by Henri and Bruno Gaudin. The firm's special fabricating process was specified to meet the technical and aesthetic requirements for the roof which is composed of face fixed panels. As a hot forming process, says the firm, SPF leaves no spring-back in the panel so fixings and panels alike are free from residual stresses formed during manufacture.

Superform Metals, UK
Tel: +44 1905 874300
Fax: +44 1905 874301

516
Duval Design, Maine, USA recently completed the design, fabrication and installation of a 50 m x 50 m tensioned fabric structure in the Plaza Central of the Parque de Recuerdo in Santiago, Chile. Conceived to shade a church congregation of 3000 people during the noon Mass on All Saints Day, it rises about 23 m above the plaza to the top of the church facade and spans the entire space in two layers. Duval Design specialises in the manufacture of large-scale fabric structures.

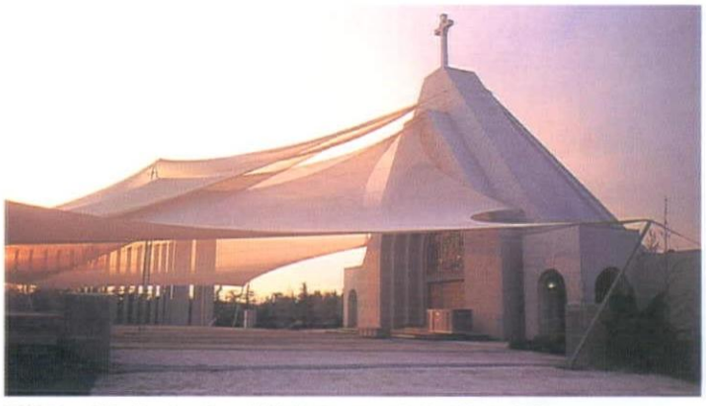
Duval Design, USA
Tel/Fax: +1 207 236 0759

517
Sky-Wall 155, the curtainwalling system from Permasteelisa, was used in the construction of the UOB Plaza in Raffles Place, Singapore by Kenzo Tange Associates and Architects 61. The steel-framed office tower, 66 storeys high, is said to be the tallest in Singapore. The double skinned, pressure equalised curtain wall consists of white pearl granite panels, aluminium framing and double glazed, clear float glass. Units were prefabricated in Permasteelisa's factory and shipped to site ready for installation.

Permasteelisa, Italy
Tel: +39 438 4911
Fax: +39 438 401 606



515 Superform Metals cladding panels at Charléty Stadium in Paris



516 Duval Design tensioned fabric structure in Santiago, Chile



517 Sky-Wall 155 curtainwalling system from Permasteelisa

If you would like to obtain more information on these products, please enter the relevant numbers (**501** etc) on the reader enquiry card at the front of this issue.



518 Transparent walkway glazed by Isiglass for Leipzig Trade Fair



519 Stoakes Systems' cladding

518
Isiglass provided the curved glass for the transparent walkway leading to the main glass hall of the Leipzig Trade Fair, designed by von Gerkan, Marg & Partners with Ian Ritchie Architects. The firm's factory can produce curved, tempered and heat-strengthened glass with a cylindrical curvature, as well as flat toughened glass, of various sizes and thicknesses.

Isiglass, Italy
Tel: +39 429 602773
Fax: +39 4 29 602118

519
Stoakes Systems' insulated rainscreen cladding was used in the construction of the RCHME Archive Store, Swindon. Designed by D. Y. Davies Associates, the building provides a controlled environment for fragile archives. Stoakes also supplied stainless-steel perforated screens and an innovative bow string truss steelwork support for the Planar glazed link.

Stoakes Systems
Tel: +44 181 660 7667
Fax: +44 181 660 5707

520
The Camellia House in Pillnitzer Park, Dresden, designed by the Dresden practice of Staufenbiel, makes use of Hueck's curtain walling systems: KF 50 and KF 60. The company has just introduced a new system, Series 1.0, said to be one of the most thermally efficient aluminium systems on the market (conforming to frame material group 1: DIN 4108), with a thermal performance similar to timber or UPVC framed systems.

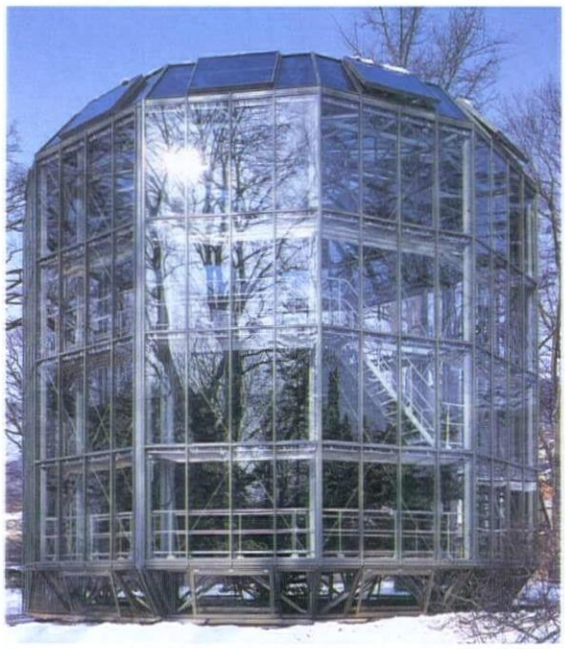
Hueck, Germany
Tel: +49 23 51 151 1
Fax: +49 23 51 151 283

Hueck, UK
Tel: +44 1932 35 42 13
Fax: +44 1932 35 42 15

521, 522
HLN Architects specified Kingspan's Monotrex flat panel cladding system, **521**, in their design of Tesco's new grocery warehouse at the Gwent Europark in Wales. The panels are insulated and smoothly finished in silver metallic Colorcoat Pvf2 from British Steel, **522**.

Kingspan, UK
Tel: +44 1352 710 777
Fax: +44 1352 710161

British Steel, UK
Tel: +44 1633 222211
Fax: +44 1633 222288



520 Hueck curtain walling in Dresden



521,522 Kingspan and British Steel at Tesco warehouse, Gwent

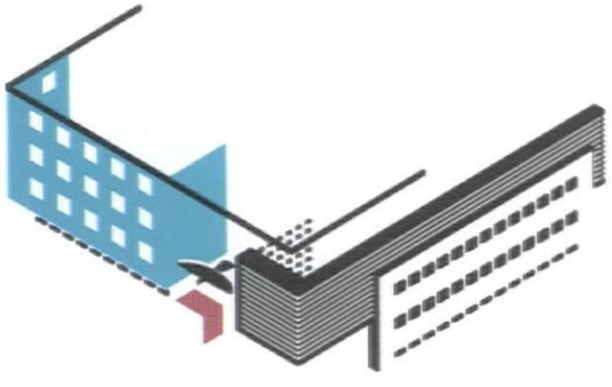
If you would like to obtain more information on these products, please enter the relevant numbers (**501** etc) on the reader enquiry card at the front of this issue.

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Architects Karelse en Van der Meer, Groningen



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Italy (02) 48 19 37 51
Portugal (01) 4 43 65 99
Hungary (01) 269 8002
US (708) 990 2025

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For more details enter 22 on AR enquiry card

Cult figure of landscape

OLMSTED'S AMERICA
By Lee Hall. London: Little Brown. 1995. £27.50.

A visionary renaissance man of the American nineteenth century, Frederick Law Olmsted has recently been elevated to cult status in the US. Much has been written about this seminal figure, both then and now, and with good reason. The father of landscape architecture, and influential in the establishment of national parks and good forestry practice, Olmsted was, above all, a social reformer who sought to use planning and parks to educate, elevate and improve. Through his writings, his design of parks and his personal convictions he shaped contemporary thought, and his projects throughout the States have helped mitigate the problems he foresaw would arise in a developing industrialising and resource-destructive nation.

Any new study of such a man must add to existing knowledge, interpretation, or reveal new perspectives. Lee Hall sets out to throw new light on Olmsted's personality and relationships and probes 'personal characteristics that some associates found difficult', as well as placing his work in context with its importance and relevance in the world of today.

Hall clearly has made use of and enjoyed the enormous wealth of letters and documents that are Olmsted's legacy. Insets with descriptions and photographs of a selection of his contemporaries give additional context. However, her chronological narrative does not significantly fill the gaps in what has already been written about Olmsted. And in essaying a comprehensive overview, from childhood to death, she treads old ground.

Olmsted's America is a valid introduction for those new to the man, particularly if it encourages the reader to broach Olmsted's own fascinating and prolific written works as well as more recent studies. However, I find it only marginally fulfils its premise and does not significantly enrich the existing literature. ELSA LEVISEUR

Grimshaw reaper

ARCHITECTURE, INDUSTRY AND INNOVATION: THE EARLY WORKS OF NICHOLAS GRIMSHAW & PARTNERS
By Colin Amery. London: Phaidon Press. 1995. £45.

Publications do not follow the same sequence as life. This is Volume 1 of the Phaidon series on Grimshaw, and deals with work up to 1988. Volume 2, titled *Structures, Space & Skin*, covered 1988-93 and was published two years earlier. The back flap tells us that Volume 3 will cover 1993-96. Interesting for an architect to have a book planned for the buildings that he may not yet have designed.

Colin Amery, like myself, has long been an admirer of Grimshaw's work. He wrote the introduction to the excellent *Product & Process* booklets that accompanied the Grimshaw exhibition at the RIBA in 1988. One reads, therefore, this new book with high expectations. In many ways it does not disappoint, for Amery writes well and his perceptive and lucid description of the growth of the practice and its ideas is pleasantly free from jargon or pomposity.

But it is totally uncritical and it makes it all look effortless. Now is not Amery a critic and should not critics criticise? Can architectural excellence be achieved without doubt, struggle and setbacks? There are so many questions that one would like to ask. How easy was it to move the Ladkam Building? Why are Citroen and *The Financial Times* moving out of their buildings? And, above all, what was the relationship with Terry Farrell who was Grimshaw's partner for most of the period covered by this book but has been painted out of the picture, Trotsky-like, to become a non-person?

Most of the book, appropriately enough, describes the buildings of the practice. Each has a little introduction by Grimshaw himself, then clear plans, sections and sketches plus a few details. I would have liked a lot more details and a lot more information on materials, finish and assembly, as Grimshaw himself says: 'Detail, I suppose, has been the essence of my work.' But the photographs are superb, the book is well printed and a pleasure to handle. I am delighted to have it on my bookshelf. JOHN WINTER

Puritan minimalism

ARCHITECTURE WITHOUT KINGS – THE RISE OF PURITAN CLASSICISM UNDER CROMWELL
By Timothy Mowl and Brian Earnshaw. Manchester: Manchester University Press. 1995. £45 hardback.

This is an important and scholarly book, by turn illuminating, infuriating, entertaining and overwritten. The first 70 pages are full of the worst sort of personalised academic point-scoring, virtually unintelligible to anyone outside the world of academic architectural history. As for the style, it is like having a bath in metaphors.

Tim Mowl is the first scholar to venture publicly into that architectural twilight time of the Interregnum between 1642 and 1660. His thesis, baldly stated, is that these years saw the development of a style which he christens 'Puritan Minimalism' (a nod to Summerson's 'Artisan Mannerism') and that Inigo Jones, far from being a washed-up royalist, was the intellectual mentor of this style. Much space is given to re-asserting Jones's claim to be the real architect of Wilton and Coleshill, the best-known houses of this period. John Webb, the other familiar architect of the time and Jones's son-in-law is rather disdained as a practitioner although his ideas and drawings were eventually to bear fruit in eighteenth-century English Palladianism.

After the architects have been dealt with, Mowl and Earnshaw turn to the buildings. For the most part the text concentrates on country houses, though there are sections on, or nods towards, London street architecture, colleges, public buildings and gardens. Not surprisingly, the overall picture across this fairly short period of 18 years is one of stylistic diversity; which with no clearly defined court style to give a lead, more than usual depended on the contacts and aspirations of individual patrons. Mowl is interesting on the London-Cambridge architectural axis and the way in which its products differed from those found in Oxford. More might have been made about any developments in the planning of buildings and surely something should have been said about the almost universal adoption of the hipped roof for domestic use.

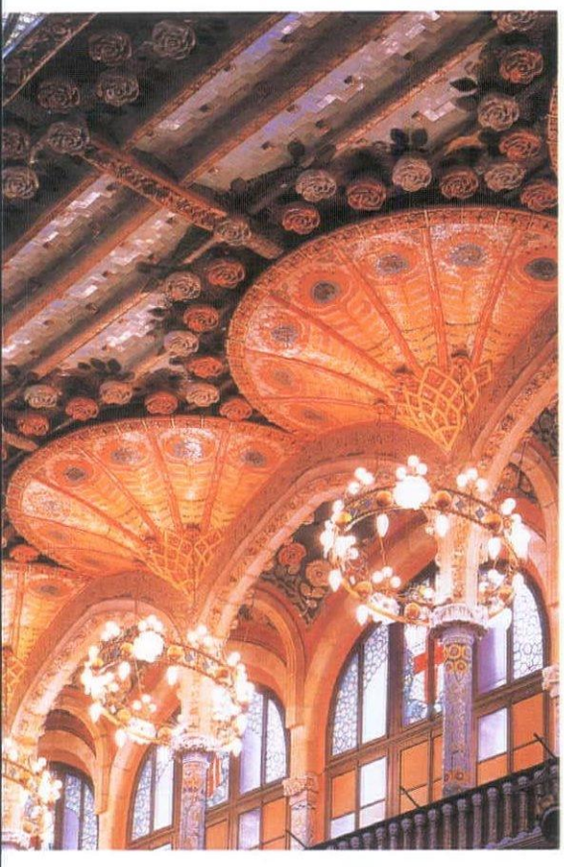
In many ways the book itself reflects the period it describes, with fascinating individual buildings but less conviction in the broad sweep of the architectural arguments. Another parallel is the way in which these arguments fall back on literary texts when hard facts are in short supply.

Tim Mowl is a stirrer; inventing new slogans, larding the text with rude one-liners, questioning assumptions and generally showing off. He makes you think. NEIL BURTON

Village people

ABOUT THE HOUSE
By Stephen Hugh-Jones and Janet Carsten. Cambridge University Press. 1995. £30 hardback.

In his celebrated autobiographical work *Tristes Tropiques*, the anthropologist Claude Levi-Strauss describes the village of the Bororo people in Brazil, which is circular, with a men's house in the middle surrounded by a ring of family houses held by women and distributed according to clan. The village is divided by an axis into two moieties, or marrying groups, so a boy brought up on one side, having moved to the men's house at puberty, is obliged to marry a girl from the other half and to move in with her. Levi-Strauss goes on to describe how missionaries persuaded one group of villagers to rebuild their huts on a grid layout, whereupon their social structure fell apart. This suggests a potent connection between architecture and society, for the form of the village evidently did not merely express or symbolise the social order, but embodied it and carried its memory. Yet it is also clear that this only



Lluís Domènech i Montaner was, with Gaudí and Jujol, an important architect of Modernisme, the turn-of-the-century Catalan expression of identity, based like National Romanticism in the north and Jugendstil in Germany, on a reinterpretation of Gothic deriving from the mid-century thinking of Pugin and Ruskin. Domènech's masterpiece, the Barcelona Music Palace (1905-08) has now been recorded in a new addition to Axel Menges' excellent portfolio of monographs on strange and potent buildings: Lluís Domènech i Montaner, Palau de la Música Catalana, Barcelona, *Manfred Sack (photographs Hisao Suzuki), Edition Axel Menges, Stuttgart, 1995, 68DM. This almost unbelievably rich interior draws on historic forms like the Gothic arches, but whips them up in a cocktail with naturalistic and symbolic decoration and nineteenth-century technology (for instance the jack arches) to make an overwhelming statement about the force and wealth of Catalan culture. The book also covers Oscar Tusquets' more sober extensions.*

worked because of a shared understanding of what it meant, including a shared concept of what constitutes an ideal village.

'Village', or 'house' can refer equally to a building or a group of people, and is still used as in the phrase 'the House of Windsor'. But the relationship between physical house and house as social group turns out to be a complicated business. In his later writings, Levi-Strauss developed a theory of 'house societies', drawing parallels between the noble houses of medieval Europe and various examples from the Americas and the Far East. He defined his concept house as 'a moral person holding an estate made up of material and immaterial wealth which perpetuates itself through the transmission of its name down a real or imaginary line, considered legitimate as long as this continuity can express itself in the language of kinship or affinity, and, most often, of both.' *About the House* is the outcome of an anthropological conference held in Cambridge in 1991 devoted to an examination of Levi-Strauss's concept by applying it to a range of examples mainly from South-East Asia and South America. They reach no firm and simple conclusions, but there is much fascinating discussion of the interaction between real and notional houses, which throws new light on the relationship between buildings and society. Also there are many references and a decent bibliography which will make this a good starting point for students of all kinds. The technical passages about kinship structure – the anthropologist's stock-in-trade – are hard-going, and for architects the most rewarding essays are likely to be those that deal most directly with buildings. Stephen Hugh-Jones, for example, presents a wonderfully rounded account of life among the Tukanoan people of Amazonia, not only explaining layout and ritual operation of their longhouses, but also the symbolism of various parts and the way it relates to their mythology and idea of the cosmos. This must excite anyone concerned with origins of architectural iconography and its significance in pre-literate cultures.

The case studies in the book are often enlightening because they break with an order of things that one tends to take for granted. Maurice Bloch's essay about the Zafimaniry in Madagascar, for example, shows how householding can be not so much the expression of a marriage as the constitution of it. When a teenage couple decide to cohabit, he builds a basic house and she brings to it the cooking utensils, but there is no formal marriage. She becomes pregnant, but returns to her mother's house for the birth, whereupon he has to woo her back to live with him. Only the third child can be born in the house, and this marks the permanent establishment both of marriage and of house. All the while, the boy adds material to the house, and gradually woven walls are replaced by hardwood planking from the forest. The house is said to harden as it matures. It gradually becomes a holy house, and when passed on to the next generation, carries an ancestral memory.

In the introduction to the book, Janet Carsten and Stephen Hugh-Jones comment on the important link between body and building, regretting anthropology's neglect of architecture. From the architectural side we should equally regret our neglect of anthropology, which has so much to reveal about the way in which people inhabit buildings and give them meanings. The many references in *About the House* to personified columns, for example, deserve the attention of anyone researching the origins of the orders. Even though this book is particularly devoted to the subject of house, there is a disappointing paucity of precise visual and spatial information. Most of the essays are illustrated only with one small black-and-white photograph, and where plans are provided at all, they are unscaled and hopelessly diagrammatic, not even maintaining the same drawing conventions. It seems a pity when an anthropologist goes to live with some tribe for a year or two, learning their language and analysing their every movement, that a day or two cannot be spent with a tape-measure making an accurate survey. We also need to know how the buildings are constructed and by whom, as this too reflects their meaning. Perhaps anthropology students should be taught to draw, or perhaps architecture students should visit them in-situ to help create an accurate record.

PETER BLUNDELL JONES

AR editor immortalised

D. S. MACCOLL

By Maureen Borland. Harpenden: Lennard Publishing. 1995. £20.

Born in Glasgow in 1859, Dugald Sutherland MacColl was a former editor of *The Architectural Review*. A fortuitous meeting and friendship with gifted architect James Marjoribanks MacLaren, who taught him the skills of watercolour painting, launched MacColl on a successful career as artist and critic. He progressed to high profile lecturer and art historian, and became keeper of the Tate Gallery and Wallace Collection.

Witty and determined, his emaciated frame belied his campaigning zeal. He was instrumental in the setting up of the National Art Collection Fund and took a passionate interest in conservation issues, most notably fighting doggedly but unsuccessfully to save John Rennie's Waterloo Bridge from demolition.

We are swept along a distinguished career with admirable scholarship and verve, drama and a dash of Scottish humour. ALAN CALDER

Baillie Scott in brief

MACKAY HUGH BAILLIE SCOTT, AN ARCHITECTURAL HISTORY

By Gregory John Slater. Isle of Man: Amulree Publications. 1995. £5.95

Slater discusses the work of Arts and Crafts architect Baillie Scott with emphasis on the Isle of Man, where he made his first buildings. Slater provides fresh insights and some new pictures, as well as drawings which have so far been ignored. An important addition to the canon.



Photograph by Hugh Broughton

Turning the corner is one of the most difficult problems in architecture and urbanism. Jujol could do it with an insouciant flamboyance now for ever lost.

Good architecture is commonly misconstrued as being expensive. Josep Maria Jujol's small block of flats in Barcelona, designed in 1923 for the developer Eveli Planelles, succinctly shows that this is not always the case. The economic building is located on the Avinguda Diagonal, the boulevard which slices across Cerda's nineteenth-century grid.

Internally the plainly decorated flats adopt as regular a plan as the trapezoidal site will permit but externally burst forward with a series of free-form balconies and a sinuous bay window cantilevered from a solid base. These curves and protrusions dynamically claim the site as they move around the corner into Carrer de Sicilia and enliven the building to become, as Jujol described, 'an authentic sculpture fit to live in'.

The superimposition onto a rationalist block of abstract forms derived from a reverence for nature gives the elevations a clear hierarchy. It also shows that Catalan *modernisme* was by no means a whimsical style but an eloquent forbear of both the expressionism which coursed through the best early European modernism and the recent work of so many of Spain's most enticing avant-garde architects. HUGH BROUGHTON