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The business magazine for the global architect

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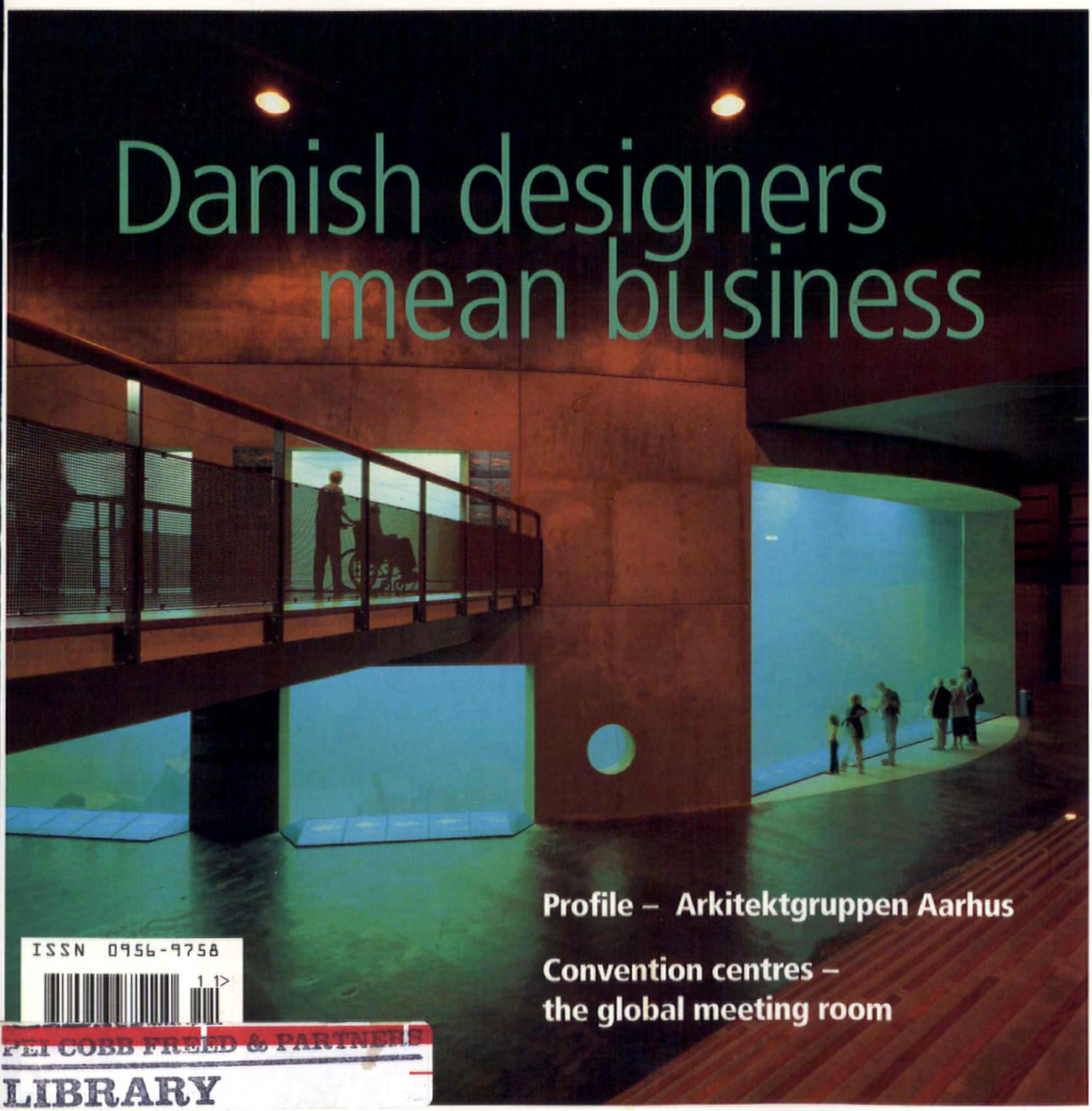

Danish designers mean business

Profile – Arkitektgruppen Aarhus

Convention centres – the global meeting room

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Solar gains – photovoltaics comes of age | Behind the scenes at the Great Belt Link | CAD – but not as we know it


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Issue Number 71 | November 1998

Cover
Hirstals Aquarium by Nielsen, Nielsen and Nielsen. Photo: Finn Christoffersen

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58 **Project reviews** Olaf Lind analyses in-depth the world's largest seawater aquarium, designed by Nielsen, Nielsen and Nielsen, and looks at the futuristic offices of Danadata by Schmidt, Hammer & Lassen. The Carlsberg Glyptotek by Henning Larsen, and Roskilde Harbour Centre by Hou & Partners are reviewed by Martin Keiding.

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Profile

72 **Arkitektgruppen Aarhus**
Scandinavia is noted for its progressive housing policies. *WA* sent Steven Willacy to meet one of the most famous firms in this field. With over 15,000 homes built since 1968, Arkitektgruppen's work has made a substantial impact on Denmark's built landscape.

80

Sector Analysis – Convention centres

80 Those who thought that computers would replace face-to-face contact were wrong. Convention centres have mushroomed in response to a demand for meeting places from global companies. Chuck Twardy looks at centres from North America to Asia, showing how architects are meeting the demand.

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96 **CAD**
Investment and visualisation were the buzz-words at this year's AEC Systems show in Chicago, as a new wave of updated CAD solutions hit the market. Richard Spöhrer reviews the new crop, and asks Yoav Eitel of Bentley Systems how the CAD market will develop to cater for the large and increasingly complex teams that carry out today's major projects.


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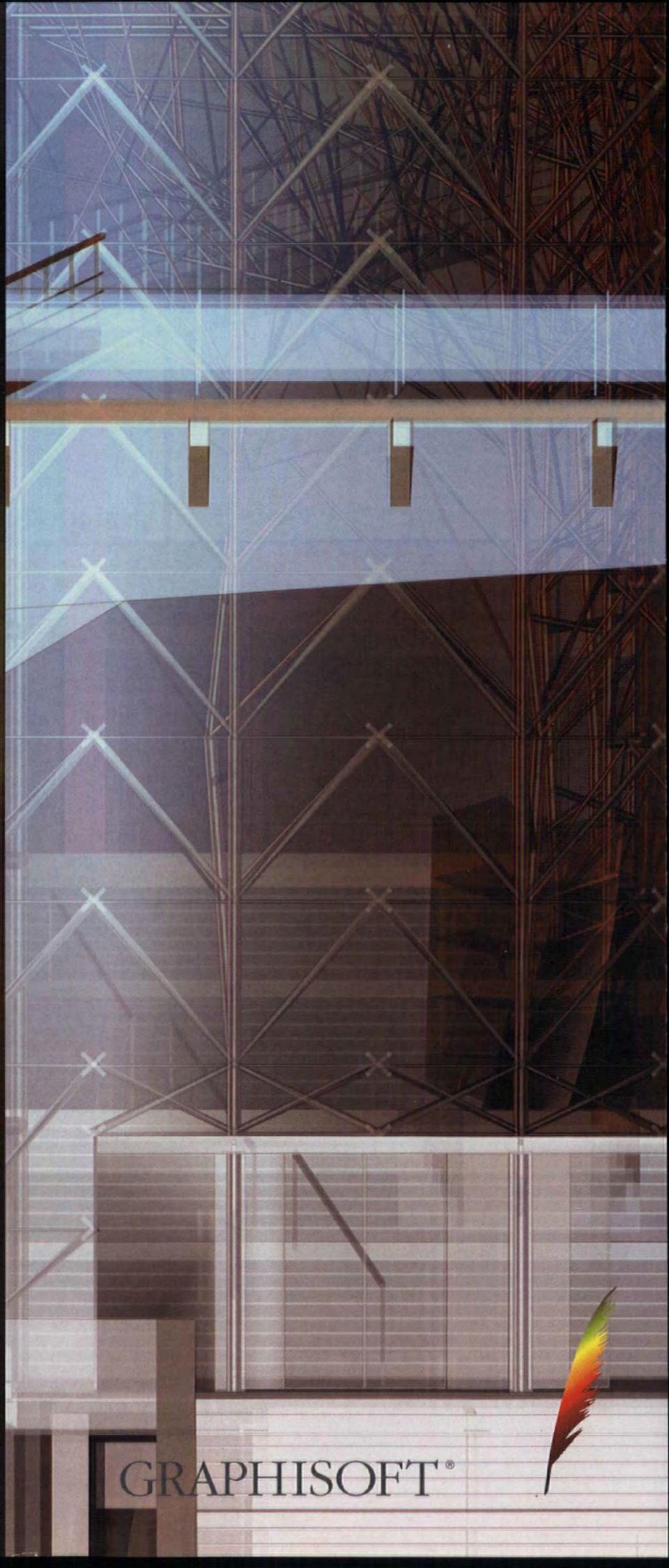
National Theater Budapest, Design: Ferenc Bán and "A" Studio '90



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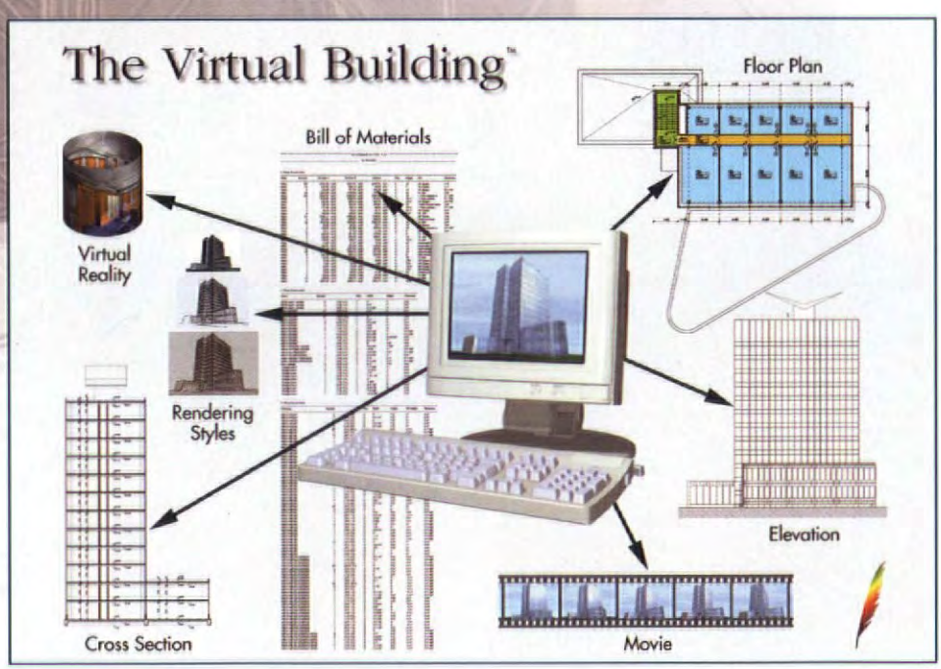

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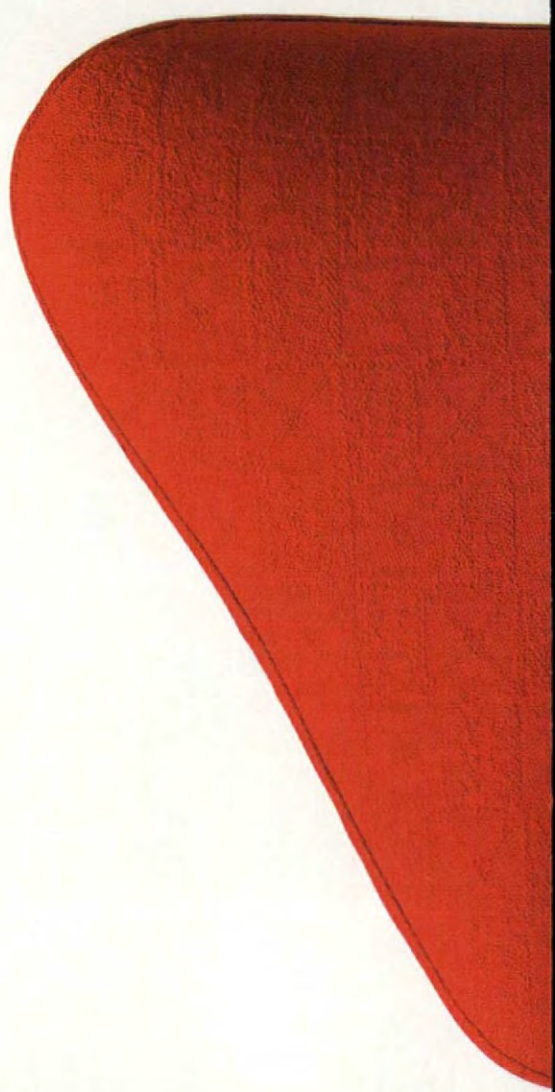

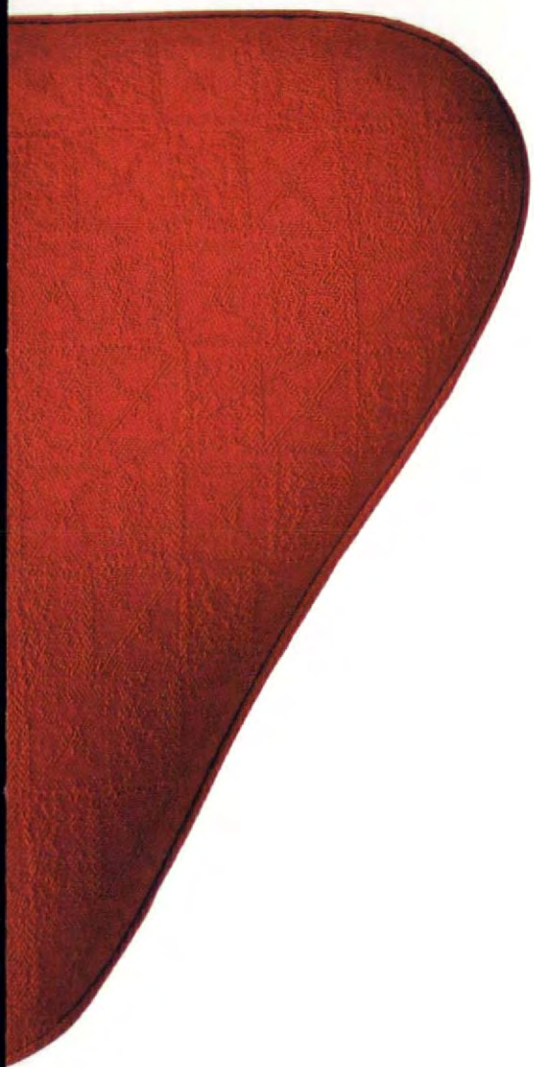

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Above from left to right:
Hong Kong Convention Centre; Hong Kong Convention Centre, featuring **d line** pull handles; Hong Kong's Chep Lap Kok airport

Facing page, clockwise from top:
d line programme; **d line** sanitary programme – horizontal format and vertical formats

Hong Kong Convention & Exhibition Centre – Extension

Designed by Hong Kong architects, Wong & Ouyang in association with Skidmore, Owings and Merrill, the Extension jutting out into the centre of the Harbour, is one of the most conspicuous landmarks of Hong Kong. In June 1997 it hosted the most momentous event in the territory's history, the official transfer of sovereignty to China. **d line** supplied the entire hardware solution on this prestigious project furnishing all doors with either U-shaped lever handles or pull handles with snap-on roses, door stops and coat hooks. Through Tung Fat Ho, the Hong Kong specialist **d line** distributor, contact was made with the commissioning architects early in the planning phase. Although the initial concept was for brass ironmongery, the decision was made to install stainless steel and the contract was awarded to **d line** because of the quality and design of its products as well as its extensive project experience. **d line**'s use of AISI 316 satin stainless steel guaranteed minimum maintenance and maximum durability also withstanding high humidity climates, a vital consideration in this setting.

Tung Fat Ho's expertise in door layouts, full specification ironmongery scheduling and master keying proved to be vital service factors and ensured the architects' loyalty to the **d line** brand. Supplying **d line** for a project of this complexity involved co-ordination with a large number of different contracting companies. Tung Fat Ho offers a complementary service package to ensure the smooth running of a project which includes site supervision, installation instructions, temporary locking facilities and permanent cylinder installation.

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New product development and a continually evolving response to market requirements is central to the philosophy of **d line**™ international as. **d line**'s core architectural ironmongery and bathroom fittings programme is to be supplemented by the addition of four new product areas. The first to be introduced is the **d line** sanitary panel programme, a highly versatile, modular sanitary concept appropriate for a variety of applications, from toilet cubicles and washroom areas to kitchenettes in commercial, institutional or residential environments. The sanitary panel programme has already been specified and successfully installed in Hong Kong's Chek Lap Kok airport. Manufactured in distinctive **d line** satin stainless steel and intended for wall recessing, the individual sanitary modules have been designed in three alternate sizes ensuring maximum flexibility. The modules are installed in panels either horizontally or vertically, the height depending upon the chosen combinations of modules. Modules include soap dispenser, toilet roll holder, paper towel, automatic hand dryer, mini waste paper bin, mini plastic cup dispenser etc. The system allows each sanitary panel programme to be tailor made to individual requirements with any combination of modules possible and comes with a locking mechanism for anti-vandal protection.

The three other new product areas which are shortly to be introduced are a balustrade and handrail system, a cloakroom system and a signage system. Together with the established ranges, these additions expand on **d line**'s initial concept providing a complete stainless steel solution which ensures a visual consistency and high quality architectural fittings throughout an entire building.

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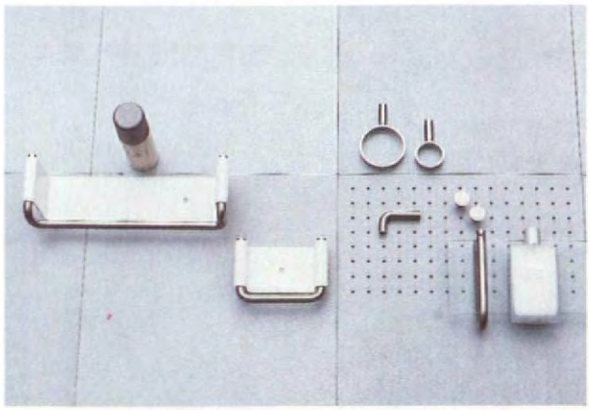

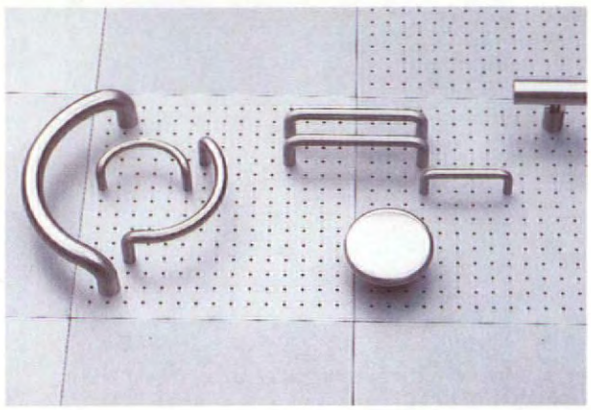

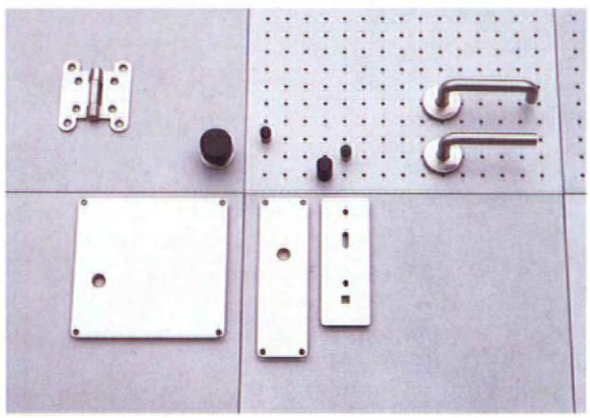

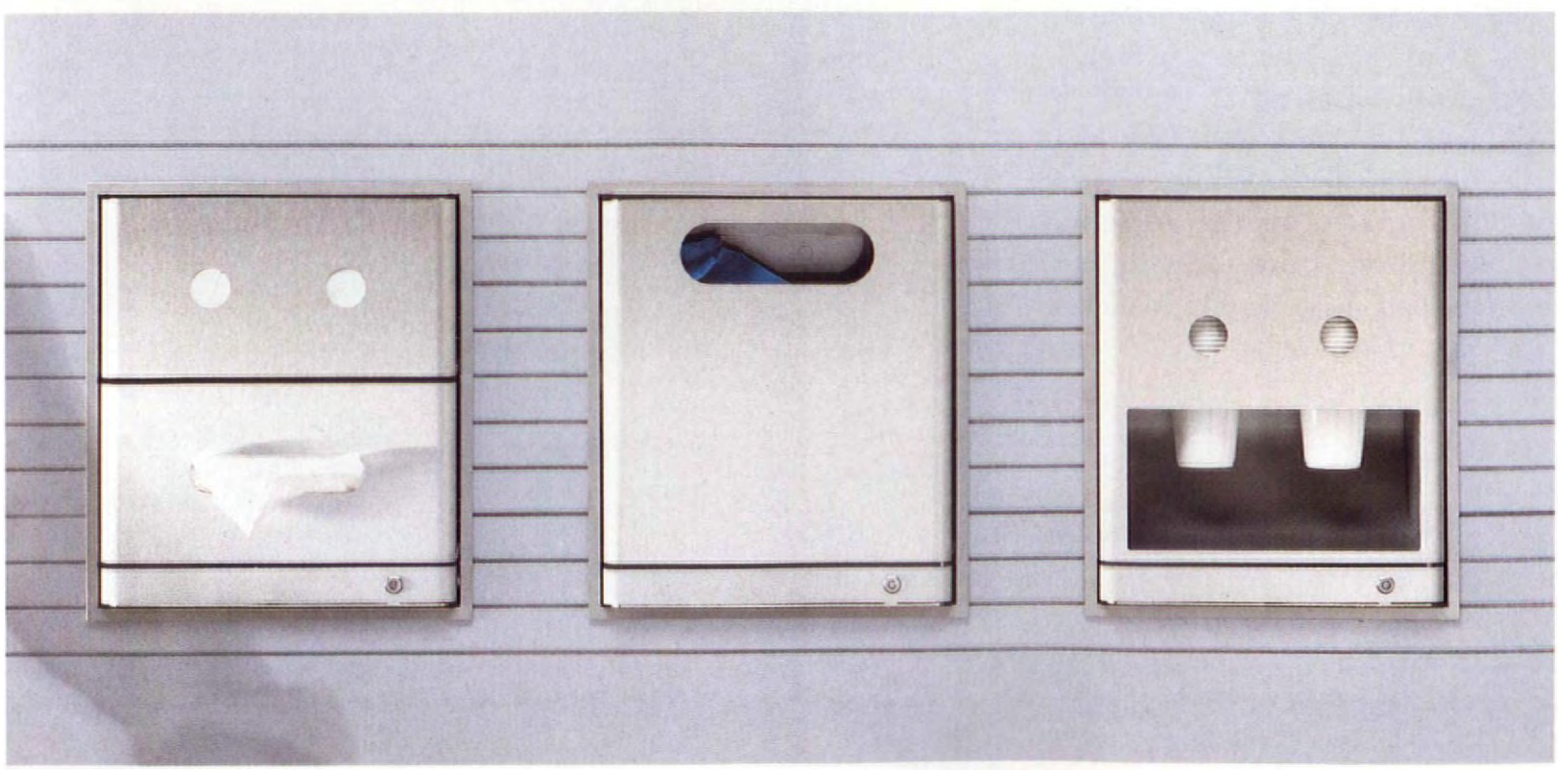

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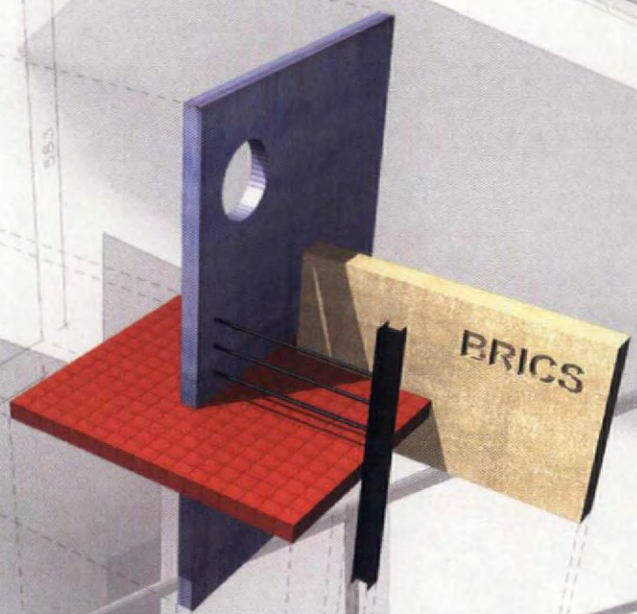
The 3D Single Building Model Concept



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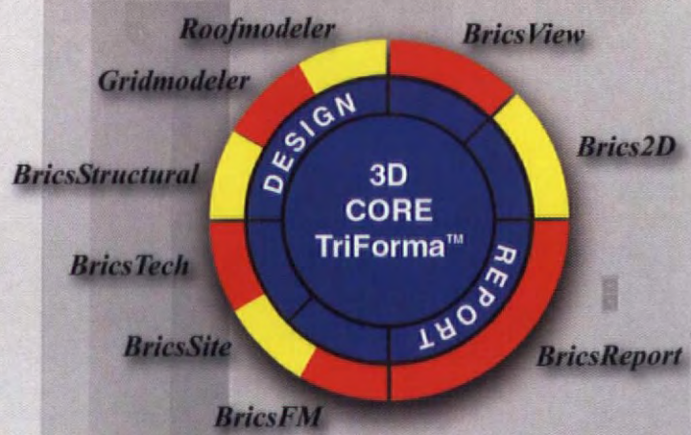

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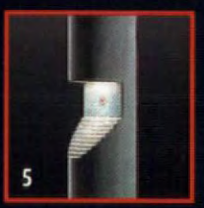

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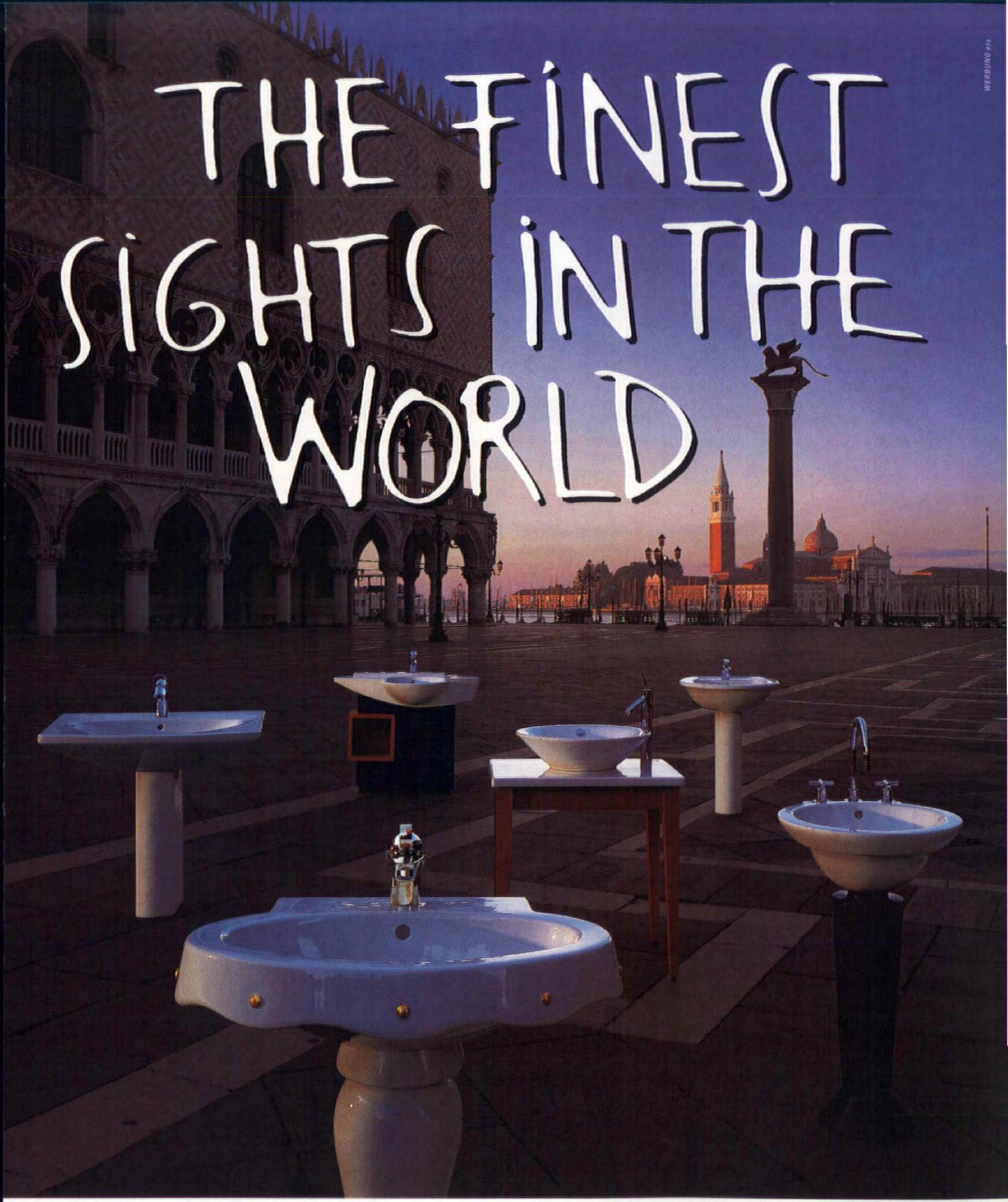

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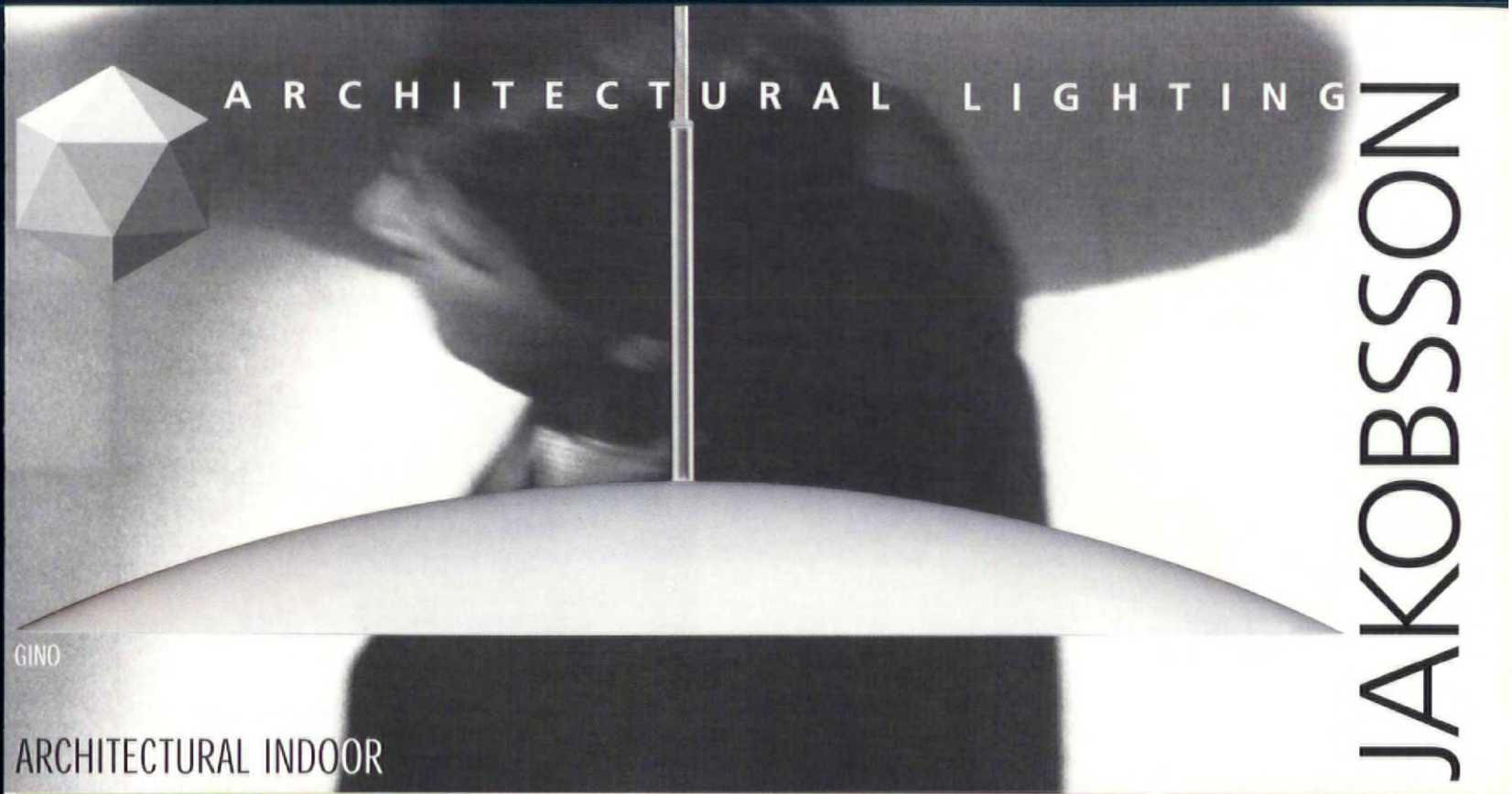

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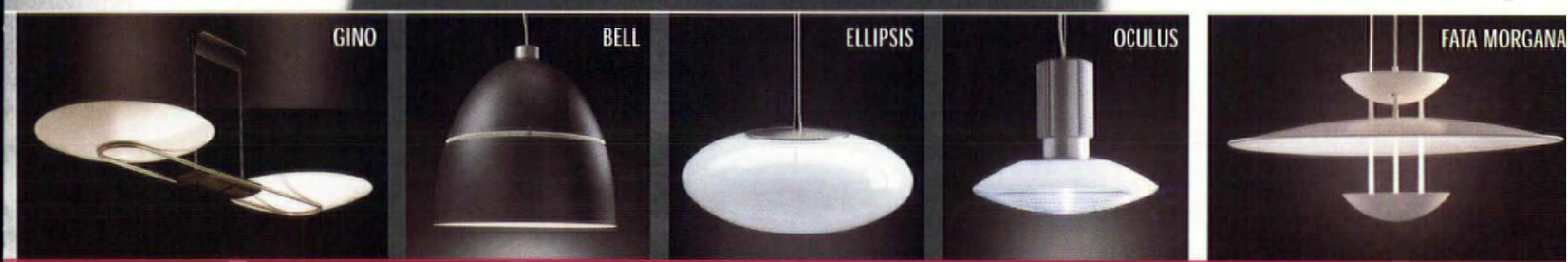

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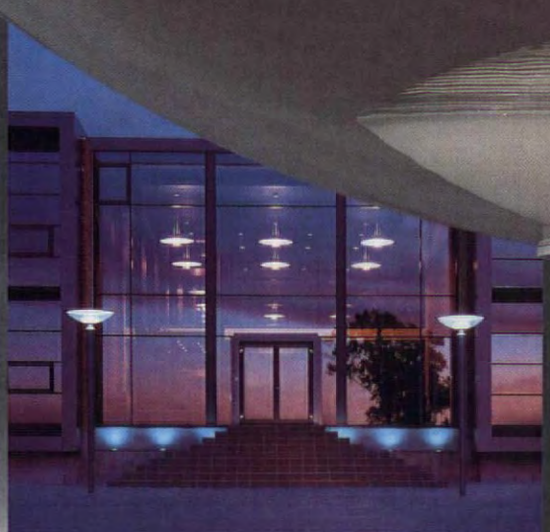

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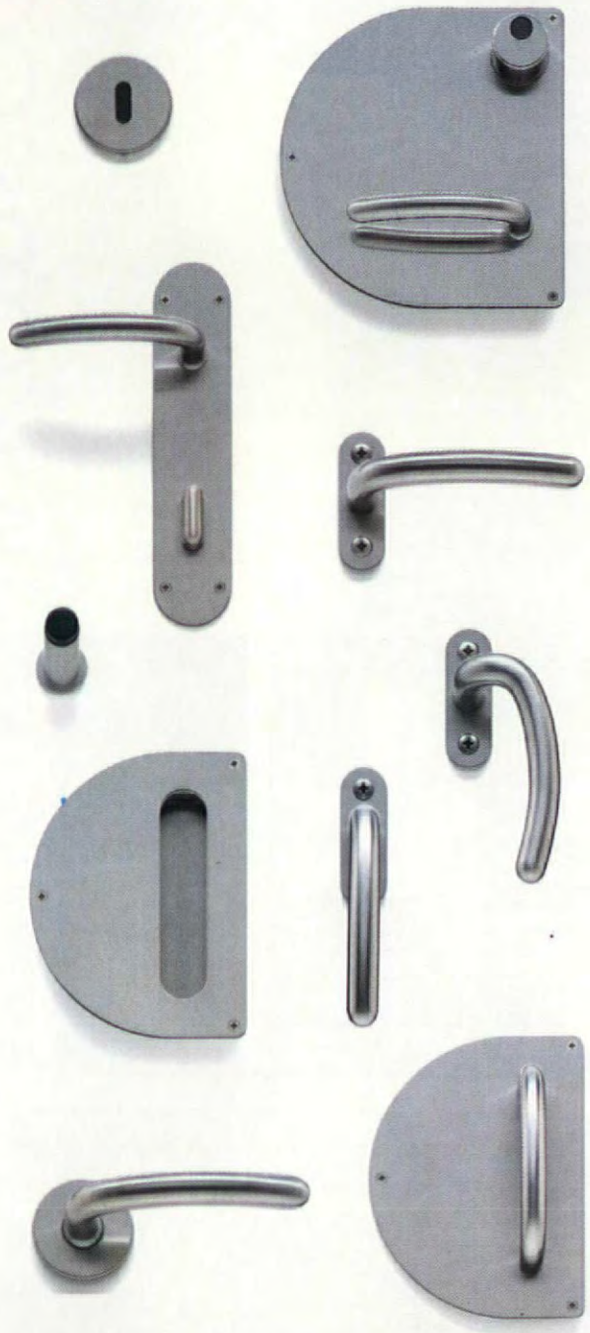

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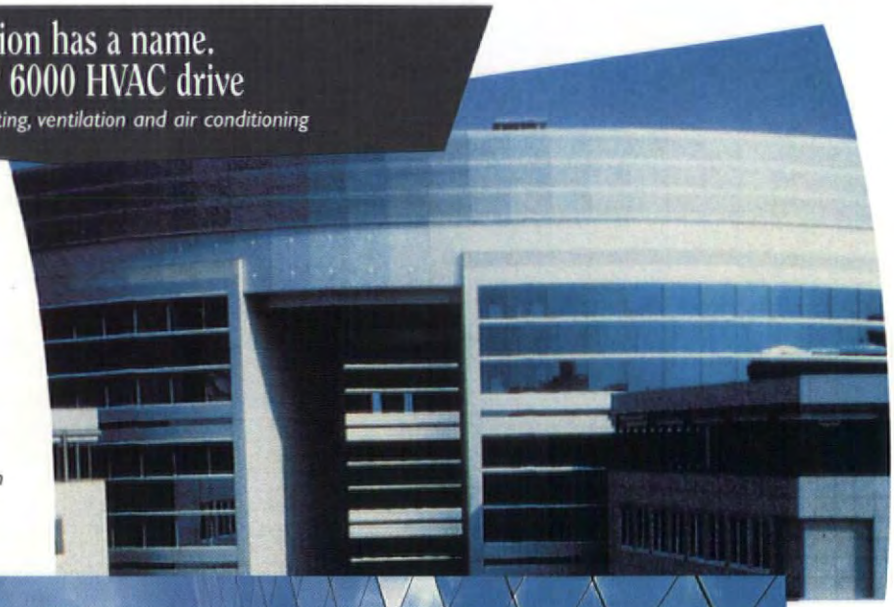

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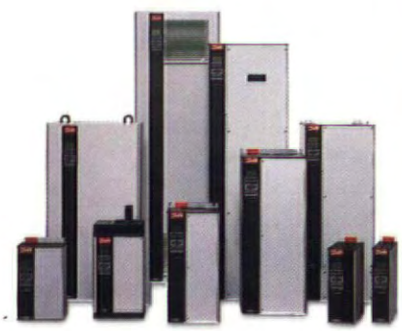

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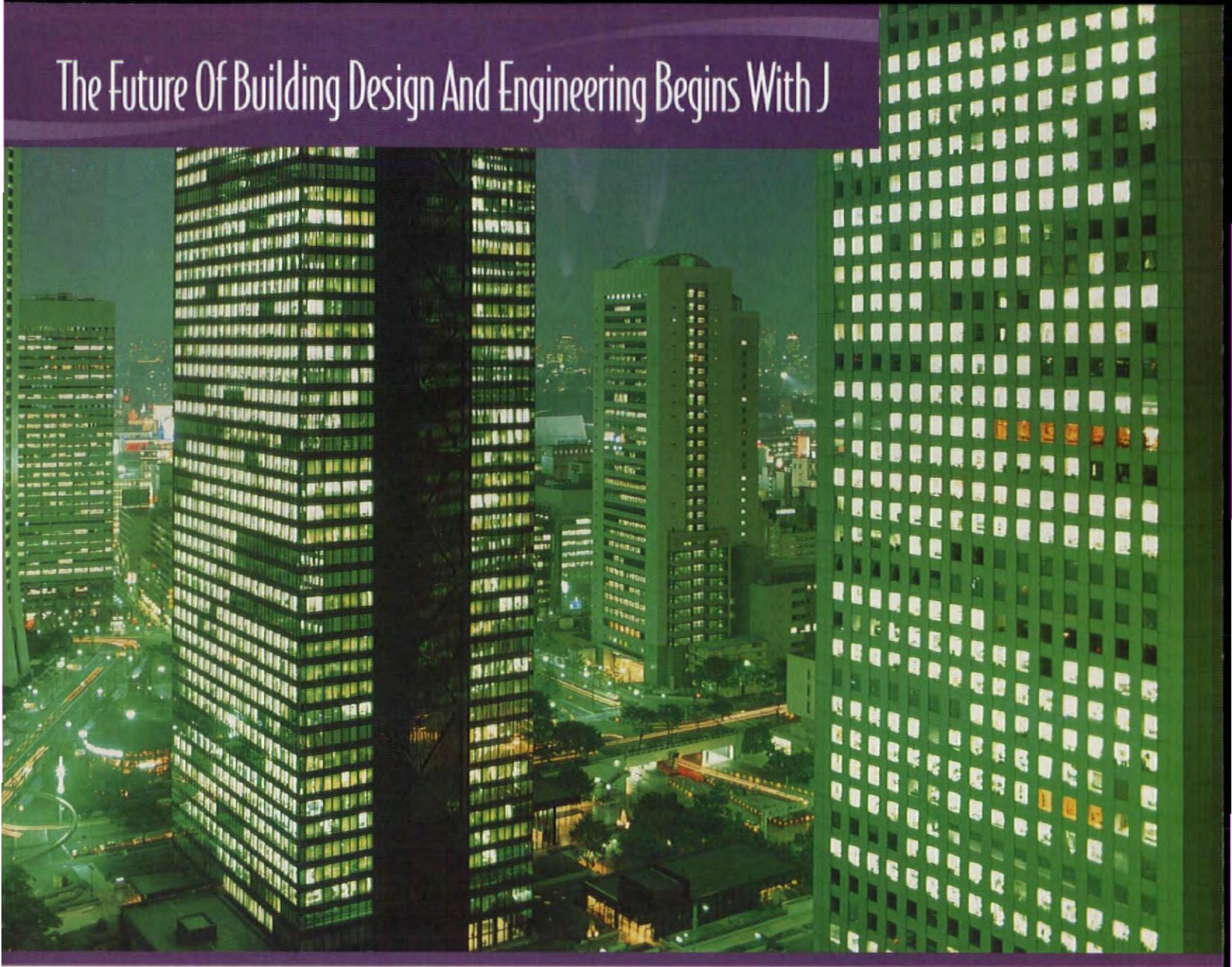

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Americans in London

At the end of September London's designer restaurants reverberated to the sound of story-swapping and polite competition from America's most aspiring international architects, as the AIA's International Committee laid on events to celebrate this year's achievements, and to chart developments in international practice. Of the foreign firms penetrating the London market the US firms are undoubtedly the most proactive and successful. Why? For while firms such as Gensler and Swanke Hayden Connell (SHC) often find themselves competing against one another for City work, the clients more often than not find themselves in project meetings with a room full of British or European-trained architects. Indeed, SHC is headed by a Brit, and Kohn Pedersen Fox (KPF) has appointed a Dutch senior associate amongst its 33-nationality staff of 90. Of the 20 languages which are spoken fluently in that office six are used to conduct business on a daily basis. Obviously an American accent is less important than a rigorous understanding of European culture for imparting the American "process" so favoured by these clients.

Given that the heart of Europe is now technically Brussels, and with the advent of an active European Union, why are American firms still choosing London as their European base? Other than the obvious advantages of historical links with the US, a common language and the strength of the City, many argue that London now has the largest pool of creative talent in the world. As well as this the UK is perceived as a neutral base for American architects with continental clients. London provides the key to unlock Europe, and as well as making good business sense America's architects are appreciating that a lot more can be done with a relatively standard commercial project in Europe than at home, resulting in some of the very best of contemporary American architecture. It's a client and cultural difference, as much as a strictly architectural one. By committing resources to design, taking risks and relishing in an entrepreneurial spirit, these firms have a strong product to sell.

Will pressure from a united Europe, the city's grievously failing public transport system, increasing advancements in communication technology, and the ever shortening of flight times mean that eventually London loses its status as international centre? KPF's Lee Polisano warns that, "the notion of what's precious and what's not needs to be dealt with" – immediately, and dramatically, if London is to retain its lead position. On a lighter note as David Walker of SHC points out: "The Paris metro is beautiful, but it hasn't made Paris an international centre of finance. The guys who make these financial decisions do not take the tube. That kind of improvement will not be what helps or hinders London, however much you think it should be."

Nicola Turner

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In next month's WORLDARCHITECTURE

Arup Associates new Hong Kong Central Station, one of many recent developments that show China is battling through the Asian economic crisis

Glazed partitioning from Acme Architectural Walls at the Cannon Offices in New York, by Cannon Architects

World Survey 1999

Following the success of the 1998 World Survey of leading architectural and design firms, the 1999 survey aims to be bigger and better than ever before. The survey uses data supplied directly by the firms to ensure an accurate representation of the business of architecture as it stands today. This data is used to compile a series of ranking tables which, when combined with extensive editorial, provides a definitive market study of the global profession of architecture.

Find out which is the biggest firm in your region, where the work is being done and in which sectors. Does globalisation – the buzz-word of the 1998 World Survey – still apply? How has the financial crisis in Asia affected the construction industry as a whole, and how has this manifested itself on the architectural profession? For the second year in succession, the World Survey encompasses the world's leading 500 firms and, through discussion with a selection of top-flight individuals, uncovers the reasons behind the success of the profession's giants.

Country Focus Round Up

World Architecture's international correspondents bring the Country Focus reports from *WA*59 through to *WA*68 up-to-date, assessing changes in the architectural and economic climate since the original reports. In crisis-hit Russia, Bay Brown finds nerves and caution but no panic on the part of foreign developers and architects. Fernando Diez in Argentina examines Buenos Airies' emergence as a global capital, and Lawrence Liauw reports that China is successfully weathering the storm of natural disaster and economic turmoil. Jonathan Wheatley in Brazil believes that although the economic outlook there is less hopeful, larger international architects will be least-affected. Carlos Vega, director of RTKL's Brazilian operations, confirms this: "If anything, the problems in Asia have diverted international investment to other parts of the world." Comprehensive reports will also feature from Dennis Normile in Japan, James Krohe Jr on the USA's West Coast, Frank MacDonald in Ireland, Tom Hussain in the UAE and Ulf Meyer in Germany.

Products - Interior fittings and finishes

Of all the decisions architects make, the selection of finishes is the most open to interpretation, yet the most vital in defining the identity of the building. Peter Wislocki's lively review of the latest fittings and finishes recognises the subjectivity involved in selecting interior materials and colour schemes. A wide range of recent products from around the world are profiled including polished plaster from Armourcoat in the UK, architectural wire meshes from GKD in Germany and glazed partitioning from Acme Architectural Walls in the USA.

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Expo exposed

Financial scandals cloud Lisbon 98

North International Pavilion was due to be converted for use as a trade show hall. The scandals will stall the process

PORTUGAL

An internal audit has uncovered a fraud estimated at US$8.7 million in a real estate transaction for Parque Expo, one of the public consortiums controlling commercial development around the Lisbon Expo site.

The head of the Expo accounting office has been jailed, and three other top Expo officials have been suspended.

The revelation has also brought about the resignation of two of the fair's top three officials: chief administrator Antonio Pino and secretary general João Martins.

According to the investigation, payments for a building site by a housing cooperative controlled by the accused were falsified in Expo accounts. Only US$4 million of the missing funds has been recovered.

Officials fear that the fraud may be only the first of several to be uncovered. Additional police investigations have been opened concerning the awarding of Expo contracts for goods and services to close family members of top Expo officials, and the illegal traffic in confidential information, passed on mainly to real estate concerns. One subject of scrutiny is the leasing through third party intermediaries of several cruise ships to accommodate Expo visitors, a financial failure that cost the Expo US$26 million.

The scandals have been a subject of parliamentary debate and are of great concern to the Socialist Government, which has promised to carry forward the investigations "to their ultimate consequences". *(See WA69 pages 44-47 for review of Lisbon Expo 98.)* DC

Massive trouble in big China

PRC

Over half the building contractors in the Guangdong district of southern China are in dire financial straits. Together they are owed a total of US$1.5 billion.

The crisis has begun to have a negative impact on the province's economy as a whole. Firms have been unable to pay suppliers' and employees' salaries for several months.

A total of 1,796 contractors (52 percent of those in Guangdong), are owed significant sums. Of this number, 311 are owed between US$830,000 and US$8,300,000, while 25 others are owed more than US$8,300,000.

It is thought that the problem has been brought about by too many contractors chasing too few jobs. Over recent years many firms have accepted unfavourable terms in order to win contracts, and have become dependent on their ability to presell apartments as a result.

Some local governments failed to pay contractors for work done because they had gone ahead with projects not yet approved by their superiors. Some have suggested that contractors have only themselves to blame for the crisis, having underestimated costs or gone over-budget. EP

Ellerbe Becket caught in the middle out east

Filial fireworks cost US$125 million

SAUDI ARABIA

Ellerbe Becket has become embroiled in a battle between two of the world's richest men, brothers Prince Al-Waleed and Prince Khaled of Saudi Arabia.

Taking exception to his older brother's plans to fund the Kingdom Tower – at 300 metres, the tallest building in the Middle East – Prince Khaled led an attack on the Riyadh building site which resulted in US$125 million of damage, including construction equipment belonging to the US architect in August. The attack caused 600 labourers to flee for their lives, whilst fire ravaged the site.

The incident arose as a result of disputed ownership of the Kingdom Holding company. Prince Khaled claimed he holds a 50 percent stake. Prince Al-Waleed maintained that he is the sole stakeholder. After a short spell in protective custody Prince Khaled has reached a settlement with his brother.

Kingdom Tower is the centrepiece of the huge Kingdom Centre, which comprises a Four Seasons Hotel, 330 private villas, a 120-bed hospital and the US$70 million Kingdom Academy – for 4,000 fee-paying students.

Ellerbe Becket declined an invitation to comment on the incident, although it is known that work has resumed on site. AM

IN THIS ISSUE

ANALYSIS pages 30-33
WA's very own Boston tea party – the outcome of the second in our series of international symposiums.

BUSINESS pages 34-35
The European Union is based on co-operation and understanding. So why isn't Belgium playing by the book?

BOOKS pages 42-43
"Contemporary World Architecture"; "Low Tech, Light Tech, High Tech" and "Natural Ventilation in Buildings"

ASIA

In brief

INDIA

APIIC provides a platform

US$30 million is to be ploughed into the development of three "growth centres" by the Andhra Pradesh Industrial Infrastructure Corporation (APIIC) – an enterprise controlled by Andhra Pradesh state government. The corporation has already acquired over 1,000 hectares of land which it intends to furnish with basic infrastructure facilities with the aim of attracting entrepreneurs to mould the structures to their own business needs. Each centre will cost US$10 million.

JAPAN

Solar gains for Kyocera

Kyocera Corp, a leading manufacturer of solar panels, has opened its new US$143 million head office in Kyoto. The 20-storey, 45,000-square-metre building, designed by Kisho Kurokawa, has nearly 1,900 solar panels on the south side and roof, expected to supply up to 12.5 percent of the building's energy consumption. (See Technical in this issue for a brief history of solar energy.)

THAILAND

Cox Group up and running

Australian architect, the Cox Group, has completed work on new-build facilities for the thirteenth Asian-Pacific Games, taking place in Bangkok later this year. The Games will be held in the grounds of Thammasat University's Rengsit Campus, 30 kilometres north of Bangkok. Thailand's leading building contractor, Christiani and Neilson, collaborated with the Cox Group on the US$110 million development. The main stadium is pictured below.

Two-year delay fear for Kai Tak town

Contamination blow mirrors misery of Hong Kong's decline

PRC

Contaminated soil beneath the Kai Tak airport site in Hong Kong could delay a multi-million-dollar urban development for up to two years. (See "Residential lifeline for HK" page 23 WA64.)

A quarter of the 580-hectare site is affected by contamination with toxic fuels, lead and other heavy metals. Experts believe that methane build-ups could cause explosions if left untreated. Tests to assess how the soil should be dealt with will take some months.

A new town, which will house 300,000 people, has been planned for the site. Kai Tak town was regarded as a ray of hope for Hong Kong's beleaguered architects and contractors as the fall-out from the South-East Asian crisis takes a grip on the ex-British colony. The project was also expected to provide employment for those left jobless after the completion of the Tsing Yi bridge and Chek Lap Kok airport projects.

Preparatory work had been planned for later this year, with building to start by the end of next year.

Nevertheless, a spokesman for the Planning, Environment and Lands Bureau has said that decontamination works will not alter the aim of having people housed by 2003.

The blow to Kai Tak comes against a backdrop of continuing gloom in the Hong Kong property sector. The number and value of property deals in the territory continues to fall sharply. The market's decline reached a new low in July, when the value of the property deals totalled US$2.4 billion, a figure 84.3 percent down on the same month in 1997. EP

China crisis - floods cost US$480 m

PRC

City officials estimate that it will take at least three years for the north-east region of Qiqihar to recover from the floods which ravaged the area in late summer. The industrial heartland bore the brunt of the worst floods in the history of the nation.

"If flood control work is a battle fraught with danger, then rebuilding our home is a drawn-out war plagued with difficulties," says Zhang Guihai, party secretary of Gannan county in Qiqihar.

The Chinese Government has agreed to cut back on spending to spare resources for reconstruction. Plans have yet to be released, but it is known that reconstruction in lesser-hit regions could take only a matter of months to be complete.

The floods in Qiqihar caused damage estimated at US$480 million (6.2 billion yuan), forced the closure of more than 1,000 factories and reduced 150,000 residents to refugee status. EP

Debts up, demand down

Profit to sales ratio at all time low for Japan's contractors

JAPAN

Japan's general contractors are still struggling under massive debts and suffering from weak demand, according to separate studies by a government think tank and a private credit rating agency.

The Research Institute of Construction and Economy, affiliated with Japan's Ministry of Construction, surveyed the financial statements of 53 construction firms listed on the Tokyo Stock Exchange and found that the average profit-to-sales ratio for fiscal 1997 was a mere 1.5 percent, the lowest level since the institute began such surveys in 1983.

In a separate survey, credit rating agency Teikoku Databank concluded that 119 leading contractors were sitting on a combined total of US$71 billion in interest-bearing debt, much of it loans to purchase real estate which is now worth a fraction of its purchase price.

Both studies suggest it will take years for the industry to re-establish former levels. DN

Housing – at last it's an issue of national relevance

INDIA

The Bhartiya Janta Party-led government has announced the long-awaited National Housing Policy, which lays out legal and administrative reforms in the housing sector and incorporates a package of fiscal and other concessions to encourage the private sector in the construction of low-income housing units.

The policy has stressed the need for foreign direct investment (FDI) in order to meet the huge requirements in the sector. It has also envisaged the creation of a secondary mortgage market, to be integrated with the financial market. Basic infrastructure services have been made an integral part of the housing development.

The policy also aims to promote sustainable development. It has recognised the role of technology in housing and also the importance of promoting energy saving building materials. AG

NORTH AMERICA

Contracts

USA

- Nobody would have guessed it, but the building on the right is actually the latest from the **Frank Gehry** production line. The multi-storey red-brick facility will house the Weatherhead School of Management at Case Western Reserve University in Cleveland, Ohio. "Two playfully curved, connected units topped by undulating ribbons of gleaming metal" is how the School of Management describes the US$33 million, 13,300-square-metre structure. Construction is due to commence next spring.

- Two New York firms, **Hardy Holzman Pfeiffer** and **Rockwell Group** are to commence a US$30 million overhaul of NYC landmark Radio City Music Hall in spring 1999. The 65-year-old building will be out of action for the duration of the six-month renovation.

- A joint venture company comprising **Thompson Ventulett Stainback & Associates, Devrouax & Purnell Architects** and **Mariani Architects-Engineers** has been commissioned to design the new Washington Convention Center. The Center will be located at Mount Vernon Square in the District of Columbia's Shaw district. Breaking ground this month, the Center is scheduled for completion in March 2003. It is anticipated that the facility will generate US$618.4 million in total economic output for the District of Columbia in its first year of operation, and US$776.7 million per annum by its fifth year of operation. (See Sector analysis in this issue for an international overview on convention centres.)

- The US Mission to the United Nations in New York is to be replaced by a larger building designed by **Gwathmey Siegel & Associates Architects**. The replacement facility will comprise 13,100 square metres. **Ove Arup** will engineer the development. Demolition is slated for 2000, and the new building should be completed by 2003. The total construction cost, including demolition, is estimated at US$42.5 million.

CN Tower transformation knits together downtown Toronto

CANADA

Entertainment, restaurant and retail elements in the 554-metre CN Tower on Toronto's lakefront are being transformed by a US$83 million, 35,000-square-metre renovation and expansion. Since opening, 22 years ago, very little of the design has been altered.

The US$17 million, 7,000-square-metre first phase – completed during the summer – includes 1,200 square metres of new retail space, restaurants, simulator rides and simulated action games. Most of the work was done at the base of the tower.

Project architect William P Nankivell of Bregman + Hamann Architects (B+H), Toronto says of the larger second phase – 28,000 square metres with a budget of US$70 million: "It will create a new architectural landmark with structural and sculptural elements using a lot of lighting and multi-media signage." Stage two is expected to begin early next year and be complete by 2000.

B+H designed both phases. Ehrenkrantz, Eckstut & Kuhn Architects (New York) produced the initial concept and the masterplan.

TrizecHahn Corporation, Toronto, has leased the tower from a federal Crown agency for 35 years, with options for renewals. The revitalised tower will tie the city's major convention centre, SkyDome stadium and the downtown core together with an extension of a climate-controlled skywalk.

CN Tower is Toronto's most popular tourist attraction, pulling 1.8 million visitors last year. AW

David W Hamilton/Image Bank

The US vs international terrorists

Massive upgrade in US embassies a certainty

USA

Following simultaneous terrorist attacks on US embassies in Dar Es Salaam (Tanzania) and Nairobi (Kenya) in August the US State Department has made an appeal to Congress for funding. The appeal requests provision for fast-track interim facilities and new embassy campuses in both cities, as well as capital to make US embassies in "high-risk" locations more secure.

Secretary of State Madelaine Albright has already pledged to rebuild the two embassies, but the extent of provision for improving security is not known. The definition of a "high risk" location, combined with the unknown element – the type of terrorist activity that architects are designing to counteract – complicates the issue. Thomas Vonier, a Washington architect specialising in security design notes that, "for the foreseeable future vehicles are going to the real problem that we face". Both of the east Africa attacks were the result of car bombs.

Press reports that Prudence Bushnell, US ambassador to Kenya, asked to have a new embassy built in Nairobi in December last year were confirmed by the State Department. She was concerned at the lack of set back from the street. Unfortunately, Nairobi did not make the annual budgetary cut.

Guilhourme Bonne

US Secretary of State Madelaine Albright outside the bomb-devastated American embassy in Nairobi, Kenya

This is not the first time that terrorist action against a US embassy abroad has resulted in a wholesale and radical upheaval in State Department policy. The 1983 bombing of the US embassy in Beirut led the then Secretary of State George Shultz to appoint former National Security Agency head Bobby R Inman to look into US embassy security measures world-wide. Inman recommended spending US$3.5 billion on upgrades over five years. The State Department requested US$2.5 billion from Congress. Congress authorised US$2.1 billion, but only US$1 billion was released.

US embassy staff the world over will be hoping that Madelaine Albright remains sensitive to their needs. (See Sector Analysis in *WA*63 for a report on embassy construction worldwide.) AM

EUROPE

In brief

FRANCE

Bouygues up 2.4 percent

French construction, television and telecommunications group Bouygues reported a 2.4 percent advance in turnover during the first half of 1998. The group expects an upturn in building and public works activities in the second half of the year, after what it described as a disappointing performance in this sector in the first half. Bouygues' order book for construction projects stood at US$3.7 billion at the end of July, against US$3.4 billion a year earlier.

Gehry centre gets new lease of life

A new use for the American Centre in Paris has been found, according to reports from the French Ministry for Culture. The 18,000-cubic-metre building was designed by Frank Gehry and opened to great fanfare in 1994. But due to financial difficulties it has been unused for over two years. The US$6.6 Centre seems set to become home to the Palais du Cinema.

MALTA

Making their minds up

A change of government has brought about an unusual commission for a UK architect. The new Labour government in Malta scrapped plans for a 450-bed specialist hospital on the tiny Mediterranean island, even though it was half built by an Italian consultant. Instead, the new government decided to convert the existing shell into an 800-bed general and teaching hospital. Norman & Dawson, a UK practice with over 30 years experience of working in Malta, won the US$200 million commission ahead of a field of seven international consultants. The Tal-Qroqq Acute General Teaching Hospital will be complete in its new guise in 2001.

Contracts

CYPRUS

- In association with local architect **Andreas Kyprianou Associates**, **Mario Cucinella Architects** has won the open competition for a new US$10.75 science faculty at the University of Cyprus in Nicosia. The three buildings – with 14,500 square metres – will go on site on June next year. Exposed concrete soffits, external shading and natural ventilation ensure that energy input for heating and cooling is unnecessary for 85 percent of the year.

GERMANY

- The competition for the new Deutsche Post building in Bonn was won narrowly by Cologne architect **Paul Bohm**. A panel of Bonn residents judged the entries. The winning proposal is composed of a series of linked rectangular structures, some with as many as 18 storeys. Chicago-based **Murphy/Jahn** came second. The US architects' 44-storey skyscraper lost out to Bohm by a margin of only 9:10, a strong indication of Bonn's inhabitants' desire to compensate for the future loss of their city's capital status by supporting the construction of a potential city landmark. Deutsche Post will invest US$115-170 million in the project – the architect is currently re-working his plans. Completion is anticipated for 2001.

- The US pavilion for Hanover Expo 200 is being designed by **SITE Environmental Design** of New York. The temporary structure is themed to reflect the diversity of the "American tapestry". The roof of the pavilion will be a patchwork of conceptual and collage surfaces, which will be seen by 4,500 passengers per hour from the cable car overhead. The Expo opens on 1 June 2000.

THE NETHERLANDS

- British-based **Alsop & Störmer** has become the first of a number of international architects to be commissioned for work at Almere – the future fourth-biggest city in the Netherlands which has been masterplanned by Rem Koolhaas (see last month's news for full story). The mixed-use city centre scheme will provide 16,000 square metres of residential and leisure facilities for the city's rapidly growing population. Dutch developer MAB is the client for the development.

SPAIN

- **Wimberley Allison Tong & Goo** has unveiled plans for The Kingdom of Don Quixote, styled as Europe's largest theme park. A 1,200-hectare site at Ciudad Real in central Spain will be transformed into a medieval, pan-European fantasy world dedicated to the legend of Don Quixote. The complex will cost US$550. (See also last month's lead new story, "US film studio's US$1.6 billion theme park".)

UK

- **RTKL** is to redesign **Nicholas Grimshaw**'s Financial Times building (1988) in London's Docklands as a leisure and cinema complex. The US firm expect to commence work on the US$20 million design contract early in 1999. **ID8**, RTKL's entertainment design studio is also participating in the project. Birmingham, UK-based **Richardson Developments** is co-ordinating the joint venture. Minimal changes are to be made to the glazed facade. Twenty cinema screens, and an unspecified number of restaurants and cafes will occupy the 20,000-square-metre interior. *The Financial Times* newspaper moved out in 1997 following its 1994 decision to out-source its printing operation.

- The regeneration of Britain's urban centres continues apace. **BDG McColl Architects** has been retained by developer Land Securities to provide the lead architectural role in the 43,000-square-metre redevelopment of Exeter's city centre. The retail-based pedestrian development will comprise a department store, a multi-storey car park 60 retail other units and 50 new residential apartments. The approximate cost for the two-and-half to three year development is US$80 million.

The new look Princesshay Arcade

Care in the Community

Richard Franssen Fotographie

The new Daimler-Benz Customer Assistance Center as it stood before cladding was complete

THE NETHERLANDS

On 15 October Daimler-Benz opened its new US$9.8 million pan-European Customer Assistance Center which will eventually serve its customers in all 17 European Union states. The technological solutions incorporated into the centre are the most advanced in Europe. It is equal in sophistication only to the "best-of-breed" facilities in the US.

The province of Limburg, where the Netherlands, Belgium and Germany intersect, was the preferred location for the five-storey, 4,600-square-metre centre, thanks largely to the availability of potential employees with the requisite language skills – the centre caters for 12 different languages. From now on, all Mercedes-Benz clients can contact customer services 24 hours a day, 365 days a year in their mother tongue.

Designed by Maastricht architect Gulikers Architecten Bureau, Daimler-Benz' Customer Assistance Center is comprised of two main buildings: the north elevation exterior is faced with green glass and black concrete; the south elevation is faced with a mixture of green concrete and natural green stone bricks.

All telephone and business transaction activity is co-ordinated on the computer screen; soon to include e-mail, fax, post and telematic channels. The latter will be able to scan a breakdown problem and its location; beam in "infotainment" – audio-video on demand to scat-back screens; make hotel and travel reservations; disable a stolen car plus many other services. VVB


Güven Incirlioglu

Rehabilitation of Hebron Old Town – one of nine Aga Khan Awards for 1998

Islamic high note

UK

The secretive "sneak" preview of this year's Aga Khan Award, the triennial cycle established in 1977, took place at London's RIBA in September. The award seeks to recognise the architects' – and in many cases engineers' and builders' – contribution to Islamic architecture throughout the world.

The criteria for selection, though painstakingly explained, remain enigmatic. You are as likely to get selected for a private residence (Jimmy Lim's Salinger Residence in Selangor, Malaysia, built as long ago as 1992), as for the slum networking of Indore City in India or the rehabilitation of Hebron Old Town. Charles Correa, Frei Otto and Büro Happold add a certain gravitas to the list of winners, but to an observer the selection still appears arbitrary. It is neither a self-congratulatory roll call for the world's star players, nor a celebration of the unsung heroes of the Third World but a hybrid of the two, which despite being awkward should also be commended for embracing all members of the construction team. NT

EUROPE

Rumbled by the rouble

Industry awaits outcome of "worst crisis for decades"

RUSSIA

As the Russian financial crisis deepens opinions differ as to how the construction industry will be affected. HOK's Moscow office has noticed no discernible loss of confidence in the market, whilst Alsop and Störmer has recognised a more cautious approach, but has yet to have a client cancel an order. On the other side of the coin, RMJM Russia has lost a US$300 million contract for a Moscow office development – the project's financial backer, SBS Agro Bank (the second largest bank in Russia) has been brought to the brink of bankruptcy. It was left to engineer Ove Arup to come up with arguably the most level-headed reaction to date. General manager Neil Francis notes, "we have not lost any contracts yet, but we are only a couple of weeks into this. We don't know what the long-term affect will be". (See Country Report Round-up in next month's *WA* for a full report on the way for forward for architecture in Russia.) AM

People and practice

NORTH AMERICA

New York City, New York, USA

Frances D McGuire has joined Cannon as the firm's senior vice president. He joins the practice (the 45th largest in the world – see *WA* World Survey 1998 *WA*62) from Boston-based architect Perry Dean Rogers & Partners.

New York City, New York, USA

Einhorn Yaffee Prescott Architecture and Engineering has promoted the following to senior associate status: Mike Elia, Anthony Hauck, Beth Lacey, Scott Paske and Joe Porcelli.

Washington DC, Washington, USA

In the wake of extensive growth in recent years Swanke Hayden Connell Architects (SHCA) has moved to larger premises in the US capital. Speaking from the firm's New York head office, principal George Alexander said, "we will be better positioned to serve a wide range of corporate and government clients throughout the mid-Atlantic and South-east regions". The firm has also named a new principal, Joseph M Spina AIA.

St Louis, Missouri, USA

Flad & Associates has opened a new office in St Louis, Missouri. The office, the firm's sixth in the US, is headed up by Bruce Sprenger AIA.

Charlotte, North Carolina, USA

Chuck Hardin has been appointed as a project architect at TBA^2 Architects.

EUROPE

Copenhagen, Denmark

Swiss architect Peter Zumthor (55) is the recipient of the third Carlsberg Architectural Prize, the most lucrative single award in international architecture – US$221,000. The recent work of 26 architects, nominated by the architectural press, was analysed by a jury led by Hans Edvard Nørregård-Nielsen, president of the New Carlsberg Foundation, and including Kenneth Frampton, Francois Chaslin and Dane Henning Larsen. The Carlsberg Prize is awarded every three years.



Above left: *Peter Zumthor. (Photo Arno Balzarini)*
Above right: *Kunsthaus Bregenz, Austria (1997). (Photo Hélène Binet)*

Venice, Italy

Massimilliano Fuksas has succeeded Austrian Hans Hollein as director of the Venice Architecture Biennial. Hollein had held the post for four years.

London, UK

Two of the largest firms in the US continue to expand into Europe, using London as their regional headquarters. Swanke Hayden Connell Architects has taken the next step in its quest to increase its London staff to 110 by the end of the year with the appointment of Robert Fry, Nick Pell and Andrew Justice as associate principals; Julian Steward as senior associate, and James Elliott and David Davison as associates of the firm. Meanwhile, RTKL – UK Ltd has promoted Jorge Berioz and Kenneth J Christian to vice president. Paul Hanegraaf has been appointed as managing director of the London office. Ron Morgan will head up RTKL – UK's European healthcare team.

Bath, UK

Multi-disciplinary practice Buro Happold has set up an International Group, dedicated to providing structural engineering for international construction projects. Led by partners Terry Ealey and John Morrison. Brian Cole will oversee the day-to-day running of the group, liaising with Buro Happold personnel in offices in Berlin, Warsaw, Kuala Lumpur and New York. The practice is currently on-site with projects in the Middle East, South-East Asia, China and Europe.

London, UK/Paris, France

US design consultancy Fitch has promoted John Harrison and Giles Marking to joint managing directors of the firm's London office. The two have filled a role vacated by Fitch's European Chief Executive Jean-François Bentz who will concentrate on integrating Peclers Paris – a French trend forecaster acquired by Fitch last year – into the mainstream of Fitch's international operations.

WORLD ARCHITECTURE SYMPOSIUM

Trading on the American Way

For the second symposium on the effect of globalisation on architecture WA's Editor, Nicola Turner, chaired a discussion with Boston's international architects, in association with the Boston Society of Architects' International Committee. Is the turn of the century the"American moment" in architecture? Is a giant MacDonalds in Tiananmen Square more or less "culturally relevant" than a Chinese pagoda? How far should America's architects be concerned with delivering "nice" or "good" architecture?

From a Boston perspective, is this a specifically American moment in international architecture?

Rayford Law (Kallman McKinnell & Wood): Having lived in Holland I can say that the Dutch certainly see the American architectural influence as dominant. In that limited context it is the American moment. There was one particular show which demonstrated the influence of the Americans on the Dutch and I suddenly noticed things that I would normally take for granted, in terms of bowling alleys and drive-in theatres and gas stations, as a building type. The influence is quite astonishing. It's a question of whether that physical influence is coming along with the culture of Hollywood and advertising and international economics. Which is dragging which along? It's important to see these cultural influences as well as the presence of the skill and know-how of Americans building abroad.

Duncan Pendlebury (Jung/Brannen): I think if this is the American moment, one of the reasons is because our domestic clients are successful, the economy has been good for a long time and our clients, especially in the Middle East, look at our domestic clients and see them as successful businesses or institutions and say "we'd like to be like them. We'd like to have a physical plant that operates to that sort of level of success". So we're approached on that sort of basis.

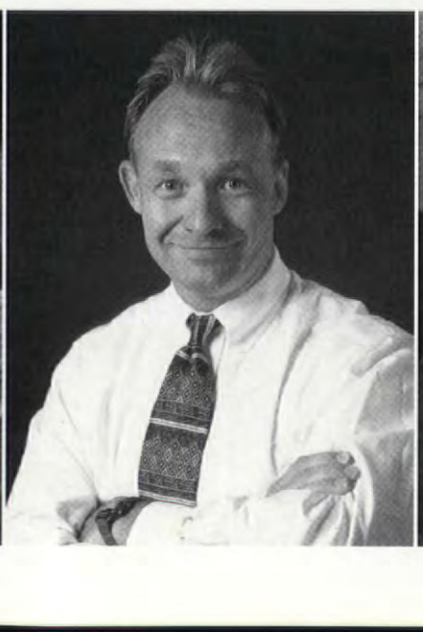
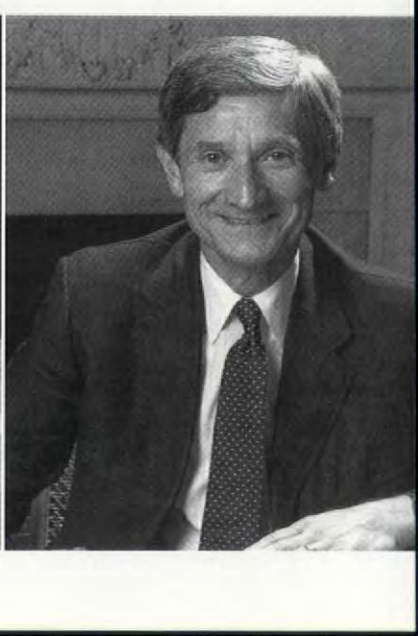
Andrea Leers (Leers Weinzapfel): I would challenge the idea that this is a significantly American moment. Certainly in Asia what's happening is a major revolution in culture over a very short period of time, which is naturally accompanied by changes in building not least of which is that land, not buildings, is more valuable in Asia so the building and rebuilding of structures is of much less importance than it is to us. It's the long term discovery of an architecture for the modern Asia which is going to produce good environments. We're going to be a little piece of it. I think the real promise comes from those of you who have been educated here and who go back to live and work in your original cultures and who bring a broad view of life in many places, and a grounding in your own place of origin. But it's a lot more complicated than recreating a life that once was, or recreating a life exactly as we have here. It's going to take a long time.

What is it about American firms that attracts the clients?

Mozhan Khadem (Boston Design Collaborative): I would say that American firms now don't need to be international, they look from their back door and there is a lot of work. But the fact of the matter is

Eric Roth



Members of the panel (left to right): Richard Green; Estelle Jackson; Gary Anderson; Charles Tseckares; Mozhan Khadem; Andrea Leers; Fred Koetter

Members of the panel:

Nicola Turner	*World Architecture*		
Gary Anderson	*Sasaki Associates*	Mozhan Khadem	*Boston Design Collaborative*
Jim Batchelor	*Arrowstreet*	Fred Koetter	*Koetter Kim & Associates*
Jorgé Cantu	*Jorgé Cantu Architect*	Rayford Law	*Kallman McKinnell & Wood Architects*
Arthur Cohen	*Architectural Resources Cambridge*	Andrea Leers	*Leers Weinzapfel Architects*
Norman Fletcher	*Fletcher Harkness Cohen Moneyhun*	Duncan Pendlebury	*Jung/Brannen Associates*
Isaac Franco	*Moshe Safdie Associates*	Charles Tseckares	*Childs Bertman Tseckares*
Richard Green	*The Stubbins Associates*	Ben Wang	*Architectural Resources Cambridge*
Estelle Jackson	*Estelle Jackson Associates*	Windel Wickerham	*Shepley Bulfinch Richardson and Abbott*
	Boston Society of Architects, International Committee	Henry Wood	*Kalman McKinnell & Wood Architects*
		Kyu Sung Woo	*Kyu Sung Woo Architects*

that clients come to America because of the political lure of this country and also they get one thing which I really don't think firms in other countries give them: extreme efficiency and organisation, even if not the best designs.

Charles Tseckares (Childs Bertman Tseckares): It's sometimes kind of a cowboy mentality working abroad. You do it with energy and gusto and then you leave. And I have a feeling Mozhan's right; project management is very important, especially in my experience in South America. And urban design I think is something that travels very easily.

Jim Batchelor (Arrowstreet): I think also there's an infrastructure that may not be as established as here, or in Europe, but they look for things which may be lacking – urban planning, highrises. In our more recent experience there have definitely been clients who pick American architects for a particular role.

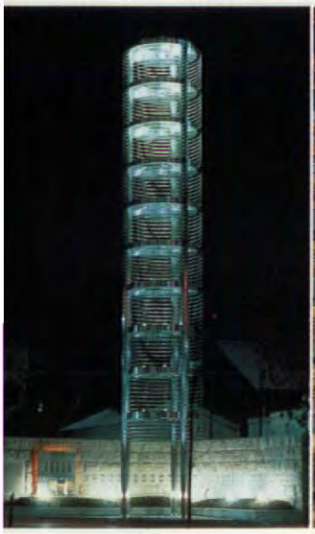
Gary Anderson (Sasaki Associates): We're often involved on the land and planning side of things. We're asked about process. They know where they want to go, they just don't know how to get there. They don't know how to coordinate a large and complicated team. Our Asian clients really desire that.

Richard Green (The Stubbins Associates): The work we do overseas obviously has a lot to do with the aspirations of the clients that we work with. They look to the success of this country and try to replicate that so they pick building types. We're asked to get buildings as tall as we can simply because there's a feeling that somehow that makes things better. Clients are trying to purchase an image, to import it.

"A recent conference in Montreal of 19 nations talked about the American influence and about how these other cultures could protect themselves from a total invasion when globalisation has totally encompassed the commercial market." Henry Wood

What is the responsibility of the American architect abroad?

Henry Wood (Kallman McKinnell & Wood): I think it's one of the greatest challenges to American architects working overseas to ›




› recognise other cultures and somehow to incorporate them without parodying them. An almost impossible job I think. I think it's significant that there was a conference in Montreal recently with about 19 nations, without America, talking about the American influence on all culture, and talking about how these other cultures could protect themselves from a total invasion of culture when globalisation has totally encompassed the commercial market.

Richard Green: One of the great lessons we have learned is that you still try and work the influences of those cultures in, but maybe you don't talk very much about it. Typically, clients don't want to hear that. It's their culture and they don't like to be preached to about it, so it has to be fairly subtle.

Fred Koetter: I think this is really an important issue because you mentioned earlier about American culture – well you go to places in Asia where things American, whether they're shoes or Levis, are compelling just because they're there. And these products include buildings, they include skyscrapers and shopping centres and for American architects to say "Oh no you shouldn't have these things" is not right. If you're talking about designing airplanes – you want to localise airplane design? It would be crazy. What would you do? Building involves technology which is advancing. The regions of the world are all a little bit different, and if you want to make things local, work with local people.

"The best reason to do international work is that it makes American work better. As one of the most parochial nations in the world every experience abroad, which may or may not be beneficial there, is very beneficial here." Andrea Leers

Kyo Sung Woo (Kyu Sung Woo Architects): American architecture is practised probably more by the local architects than by the Americans in a way, because of the transfer of information, and non-Americans training in America. It's a much bigger issue than just how we as American architects practice overseas.

Andrea Leers: The only way I know to even broach the issue of working abroad is to actually spend time there, be in residence, have staff who will work on it permanently, understand the technology available, what the patterns of use and the socialisation of those places are.

How can global architecture be harnessed towards the creation of a mutually beneficial culture whereby enduring and ingenious design across the board transcends the current trend for celebrity architecture?

Charles Tseckares: I think that we really have to be careful here to make sure we don't get too esoteric, because the concept of international work and national work is driven by where the dollars are. In 1978-1980 I remember seeing a world map with the projected dollar value of construction throughout the world and of course the countries would show in proportion to money not in proportion to their physical dimensions, so all of a sudden the Pacific Rim and Middle East were pretty damn big. One is the commerce aspect and one is the design aspect, which you really want to do as an architect. Regarding the commerce aspect, we were interviewing firms in Chile and all of a sudden they were coming back and saying "we've got working drawings to sell you, so why should you spend the money that you have on draftsmen in Boston when we can do the drawings – we don't even care where the project is" – and they were selling the idea of relatively inexpensive but highly skilled engineer/architects who could produce construction documents for us. It's a matter of time and cost efficiency.

Mozhan Khadem: I think there is another side to this coin. After the Second World War the world rushed to America for everything they could buy. The conflict is that the non-Western parts of the world have bought Western culture at the dear price of their own cultural slavery. The majority of architecture has to be the discovery of the outward expression of the culture. That act of discovery is much more joyful and interesting than giving vent to idle fantasies in signature building in a place where neither the culture nor the climate will accept it.

Fred Koetter: Don't you think that much of the architecture we're talking about is representative of its culture? You might argue that it's ugly, vulgar and nasty, but it's a reflection of the country's aspirations, the forces that have put it there. I get nervous when all of a sudden some architecture is "not nice", and other architecture is "nice", and the reason why its not nice is because it's not pretty or not culturally meaningful. I don't know what that means? Is one of



Above from left to right: Doosan 100 Year Park, Seoul, South Korea by Sasaki Associates; Adma Opco headquarters in Abu Dhabi, UAE by Jung/Brannen Associates (see WA65 pp 52-53); private residence, Boston by Kyu Sung Woo; model study of Koç University, Istanbul, Turkey by Boston Design Collaborative; Landmark Tower, Yokohama, Japan by The Stubbins Associates (see WA 61 pp 62-65); OPCW building, The Hague, The Netherlands by Kallmann McKinnell & Wood Architects; model shot of Beirut Tower, Lebanon by Koetter, Kim & Associates

the world's largest fast-food restaurants in Beijing culturally meaningful or not? I tend to think it's extremely meaningful culturally because it's there. Something has gone wrong with the world because these things which are decimating local tradition are cropping up all over the world. What brought them to be there? The forces of international commerce and mass marketing and mass consumption put them there and that's the way the commercial business of the world operates today. And I don't think it's all great but I don't think it's all so bad either. Because if we're going to transform this into a tasteful environment we may be losing more than we gain.

I don't think those big buildings are just imports from America, I think they represent complex currents of economics and production that you've got to think a little bit more about, because our notion of what is nice architecture might be quite wrong! When I first went to Shanghai it was a pretty amazing situation, a pretty powerful experience and a lot of it's not very pleasant , but a lot of it is. I don't know what to make of it. Maybe this current obsession with trophy high-rises will pass, but I don't think we can make moral or aesthetic judgements about it. People who put those buildings up are not fools. They've got US$100 million they're not just throwing it away.

Ultimately, do things re-localise or do they become increasingly internationalised? One hopes that the course of events will be a process of re-localisation but there's nothing that's going to ensure that. It could become increasingly globalised and the differences between places become further eradicated. People today are experiencing changes of rapid communication and are also being thrown further from the roots of their culture, and sometimes they're doing it self-consciously in a big way.

What are your experiences of collaboration overseas?

Jim Batchelor: Right now we're working with some clients who value both local and overseas input. And it's that client base which is going to make the question about a mutually beneficial culture possible. It's most helpful if the client's see that's desirable because then they'll both pay for someone to fly long distance and insist that the local firm has it's direct role. What I think is harder to do are alliances between architectural firms in different parts of the world who will promote themselves together in locations throughout the world.

Gary Anderson: Collaboration is a messy term I've found. There are a lot of architects who say that collaboration is when the other team do exactly what you tell them to. That's a great collaborator! The people we work with internationally are almost always top-flight firms, they have a lot of experience, they're savvy, they've been in the US, they worked for corporations. It is a much messier process. You show them something and they say "I don't know about that". Or you post a drawing and it comes back changed the next day. You bat around but it makes it a richer experience.

Isaac Franco (Moshe Safdie Associates): The fact is the fees have a lot to do with cultures too. We did a competition for Shenzhen for a concert hall and library and when we looked at the terms of competition we couldn't imagine ever being able to do the work for the fee. But the institute in China said no problem. You do whatever you need to do you take 95 percent of the fee and we'll do the rest. If they put themselves in that kind of situation how can they not be patronised?

Fred Koetter: I think reasons for architects taking up overseas work is a combination of moving to where the work is, and because there's a curiosity about working in unusual situations that in itself is stimulating. It's a combination of the two. People don't live off curiosity. I wonder whether at the end of the day people here feel it is worth it – whether they have gone too far overseas at the expense of local work. The romance of the operation fades pretty quickly and I'm wondering how much all this benefits either the sender or the receiver?

Richard Green: You try to sensitise yourself to the immediate situation, and when you go to a foreign land and culture and climate somehow it's more immediate and it forces you to be more sensitive to that. I think it helps us, and although we limit our overseas work, I do feel that we've been blessed by having some terrific relationships. Also as designers we have been forced to confront the world on new terms. I think that's really helpful. The hardest thing to do is to bring that home and look at your own environment with that same freshness.

Andrea Leers: I think the best reason to do international work is that it makes American work better. We're one of the most parochial nations in the world, so every experience we have working abroad, which may or may not be beneficial there, is very beneficial here. It gives us a better understanding of who we are, what we do and how we can do what we do in a broader way. WA

Business

A long way from unity in the European Union

For the first time in recent memory Belgium has earned a reputation beyond chocolate and Victor Horta's art nouveau architecture. It's just a shame that it's a reputation born of alleged political malpractice and paedophile rings. In September, as 12 lawyers and former government ministers defended claims of corruption in the Brussels High Court, the "illness" which is sweeping the nation touched the construction industry, following the Belgian Government's decision to refuse to recognise architectural qualifications gained in other EU countries. As Alan Osborn found out, the implications for the industry are enormous.

A threatened court case in Belgium has thrown the spotlight on a potentially major problem for architects wishing to practice in a foreign European Union (EU) member state. The government in Brussels has refused to recognise qualifications of architects and other professionals which are not won in Belgium itself.

The European Commission has sent the Belgian government a "reasoned opinion" saying it believes Belgium has broken the law on "the freedom to provide services in respect of professions for which qualifications [diplomas and experience] are required". According to the Commission, too many obstacles have been placed before architects from other member states who wish to practice in the low country kingdom, breaking one of the key principles of the EU: that its citizens should be free to live and work in whatever country they choose. The key piece of legislation is the Architects' Directive of 1985. Under its terms, professional training and qualification is not harmonised throughout the 15 EU member countries and so remains under the control of national states.

In short, all EU governments have the right to refuse recognition of diplomas granted in other EU countries. But to help professionals acquire the experience and qualifications required, the directive forces member states to hold "comparative examinations of the qualifications required ... on its territory and the qualifications, including diplomas and any professional experience, held by the person concerned".

"In the host member state, the migrant [architect] may lose some rights which he enjoyed in his member state of origin." Spokesperson for the European Court of Justice

In this way, a professional is able to pinpoint exactly what further study or work experience they need before becoming fully qualified in the country where they hoped to live, instead of having to undergo the entire course of study usually required.

This obligation first arose from a ruling laid down by the European Court of Justice (ECJ) – the legal guardian of EU treaties and law – in the 1991 Vlassopoulou case. Mrs Vlassopoulou, a Greek woman with Greek legal qualifications, was refused an application to practice as a lawyer in Germany. In finding for her, the ECJ said it was up to the host state to make a "genuine assessment" of the qualifications granted by other countries and to state the reasons why they believed these were inadequate. In the present architecture case Belgium alleges that the European Commission, "has refused automatically and on principle to apply this examination". Unless it changes its position, warns the Commission, the matter will be brought before the ECJ which could order the Belgians to comply.

Is this one any good?

If this happens, the ECJ judges will have to pick their way through a particularly complex case. The dispute arises from a complaint by Nicholas Dreessen, a German living in Eupen in eastern Belgium close to the border with Germany. Mr Dreessen holds a German engineering diploma and is allowed to practice architecture in Germany but his request for admission to the Liège Council of the Belgian *Ordre des Architectes*, (the architects' professional body), was turned down on the grounds that he had never actually practiced as an architect and that his German qualification was not a specifically architectural one.

Among other things, the Belgians require two years of practical experience as an architect before recognition is granted. An appeal against the *Ordre*'s decision by Mr Dreessen was subsequently rejected by the Belgian Court of Appeal in Liège, following which he contacted the European Commission to take up the matter. The National Council of the *Ordre des Architectes* has now reacted with "astonishment" to the step taken by the commission and flatly denies that illegal obstacles have been placed in the path of foreign architects. "There are over 400 architects from other EU countries working in Belgium at the moment and every year dozens are admitted to the Ordre without any serious problems," M Luc Heyvaert – the Ordre's legal officer told *WA*, "It is just not true that Belgium refuses

recognition systematically."

But what about the Vlassopoulou judgement and the requirement for an examination by the host state? Mr Heyvaert claimed that this did not apply because Mr Dreessen had never practiced as an architect and this made "a very fundamental difference". The Ordre had not been asked to conduct an examination of Mr Dreessen's qualifications, he said. Moreover the Vlassopoulou ruling stipulates, according to an ECJ official, "that it is for the national legislation of the host member state to define what is covered by the field of architecture and to lay down the rules covering the profession." While foreign-qualified architects would have the same legal status as those who qualified in the country "the migrant may lose, in the host member state, some rights which he enjoyed in his member state of origin," without breaking EU law. Meanwhile, it now seems just possible that the Dreessen case might not come to trial. European Commission officials said that in a new letter following the original allegations, the Belgian government has said that it "does not entirely reject the new request of the plaintiff". A commission spokeswoman said: "There are to be further contacts with the Belgian authorities and it is possible that an arrangement can be agreed."

"It is just not true that Belgium refuses recognition systematically."

M Luc Heyvaert, legal officer for The National Council of the Ordre des Architectes, Belgium

Already a meeting has been arranged between a Secretary-General (senior civil servant) of the *Ministere des Moyennes Classes* and the Liege Provincial Council, to try and reach a solution. The *Ordre des Architectes* will not take part. "It's the state of Belgium that's in the court," says Mr Heyvaert, who was pessimistic that a court case could be prevented, saying: "There will have to be a new element in the case, and I do not see any new factors."

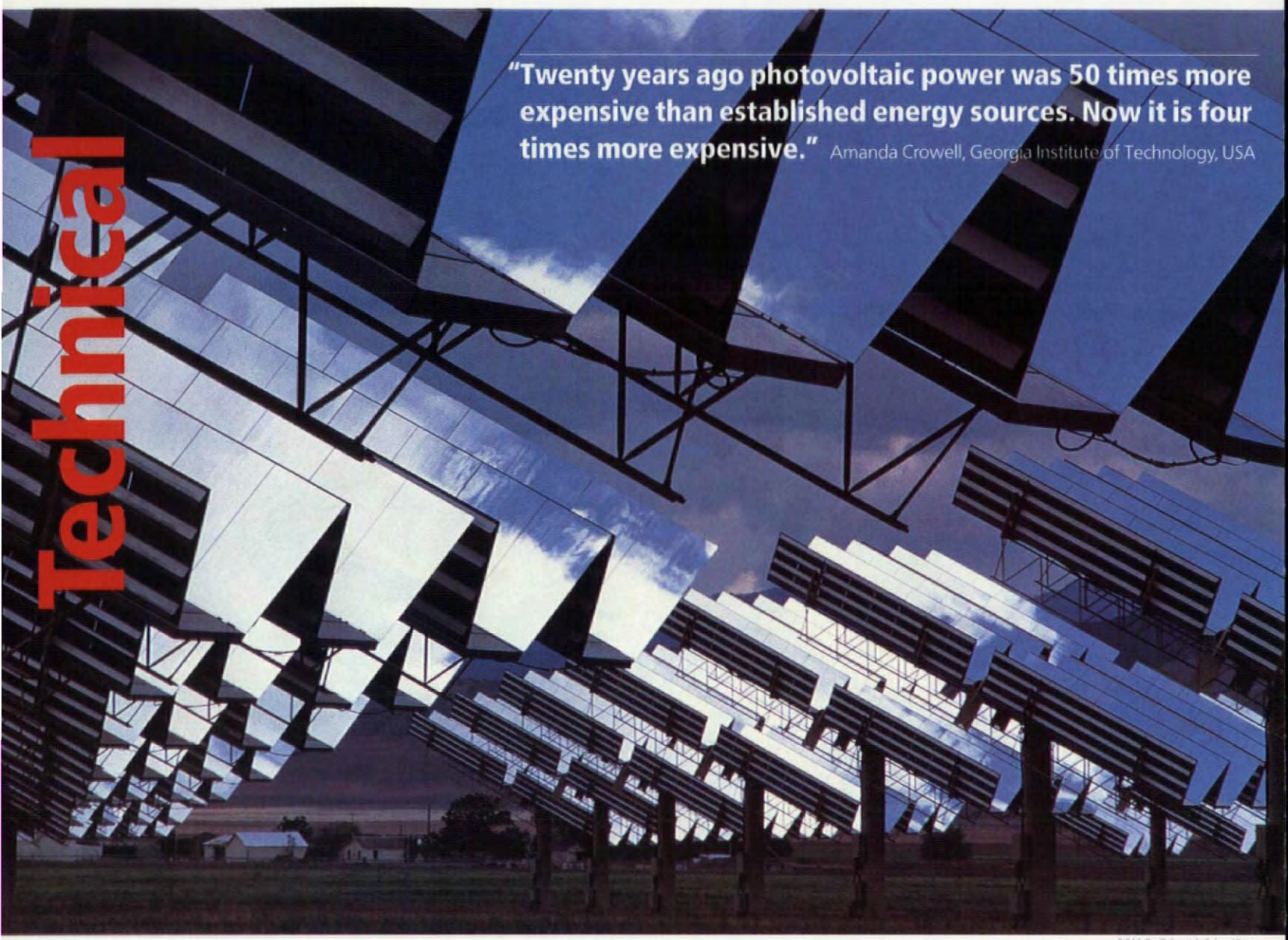
Wherever next?

Whatever the outcome of the Dreessen affair, the special characteristics of the case might limit the broader inferences that could be drawn for architects seeking work in other EU countries than their own. But it may provide guidance for how the existing 15 member states will be expected to react when countries like Poland, Hungary and the Czech Republic enter the EU and their architects and other professionals seek to practice in other established and richer EU countries to the west.

Given the radical differences in the training and qualification of architects in central and eastern European nations, major difficulties are on the horizon. If a long-term member of the EU, such as Belgium, can cause problems as a result of a personal interpretation of the regulations as they stand, the prospects for architects from the ex-Soviet satellite states are bleak. Will future member states be forced into protecting their architects from being swamped by ultra-efficient, Western architects through a process of isolationism? Will architects from future member states be forced to mimic the business practices of Western firms in order to practice in their home nation?

If the Dreessen case transmits one thing, it is a clear message that the European Commission will not countenance an outright refusal of a member state to recognise that a foreign aspirant architect is even part qualified to do the job. WA

Technical



"Twenty years ago photovoltaic power was 50 times more expensive than established energy sources. Now it is four times more expensive." Amanda Crowell, Georgia Institute of Technology, USA

B C Moller/Telegraph Colour Library

Solar, so good

It's taken a while but the era of building-integrated photovoltaics has arrived. In layman's terms this means that solar energy is no longer the exclusive preserve of liberal eco-warriors in isolated idylls. Steven Strong of Solar Design Architects explains why it took so long to become commercially viable.

Twenty years ago, while the second major oil embargo gripped the industrialised world, solar photovoltaics (PV) was touted as an alternative-energy marriage made in heaven: high technology meets low environmental impact. Two decades later large-scale acceptance of PV might appear to have been side-tracked by the stabilisation and even reduction of fossil fuel costs, but despite the lack of fanfare the promise of PV hasn't failed.

A new generation of building-integrated components for roofing, facades and other features on large urban structures has made it possible to generate electricity on-site without sacrificing design integrity to the requirements of add-on PV modules. In today's climate of concern over global warming and the eventual upward spiral of conventional energy costs, these innovations have captured the interest of architects throughout the world.

We have the technology ... but we don't know how to use it

Photovoltaic technology was born out of the necessity for generating electricity far from established grids, in situations where battery storage alone

Facing page:
A bank of solar panels in the American mid-west

was out of the question. Although the discovery that sunlight acted upon certain semi-conductors to stimulate electrons into a flow of electricity long pre-dated the exploration of space, it was the satellites of the 1950s which first benefited from PV as a power source. As space programme applications refined the technology and brought prices down, PV became an increasingly attractive alternative for small, isolated residences – a market which is still vigorous in those places: the American west, the Australian outback and islands throughout the world. This stand-alone approach has also been adapted to the needs of isolated villages in the developing world. In virtually all such applications – nearly 500,000 world-wide – PV works in tandem with battery storage banks and auxiliary conventional fuel generators.

The concept of "utility-interactive" PV first gained attention during the late 1970s. The idea was to tie PV-equipped structures into an existing utility grid, which in effect would provide "backup" and obviate the need for battery storage or auxiliary generators.

Utility-interactive photovoltaics make sense for a variety of reasons. Utilities – and consumer/producers – take advantage of a grid infrastructure which is already in place. With the implementation of "net metering" policies throughout much of the USA and in Japan, Switzerland, and parts of Germany, utilities credit owners of distributed PV installations for power produced versus power consumed, on a one-to-one cost basis. Also, utilities enjoy "grid support" offsetting expensive peak-load kiloWatt-hours with customer-supplied power. One obvious example of this equation is the enhanced input of PV-generated power into the grid during the same time of day in which sun-driven air conditioning demands are also peaking.

With these advantages in mind, in 1985, New England Electric Company commissioned SDA to design the world's first "PV-powered neighbourhood" incorporating a 100 kiloWatt peak (kWp) installation of distributed rooftop arrays in Gardner, Massachusetts. California's Sacramento Municipal Utility District, the New York Power Authority, and other US utilities have since announced distributed-PV programmes with more ambitious goals. On the governmental level, the US "Million Solar Roofs" initiative (target: 2010) joins similar ventures under way in Austria, Germany, Switzerland, the Netherlands and Japan. The Japanese goal is to subsidise some 70,000 distributed rooftop systems, with a generating capacity of 200 megawatts. ›

"The acceleration of BIPV's acceptance will depend as much upon advances in public policy and planning foresight as on technology" Steven Strong, Solar Design Architects, USA

Reisjard Schropp

Developments in BIPV technology allow PV components to substitute for conventional building materials. The glazed corridor with integrated PV at the De Kleine Aarde building in Boxtel, Netherlands combines two functions: the production of electricity with shading

© EPFL-LESO

Architect Marc Rutschi designed the canopy of this railway station in Morges, Switzerland to generate electricity; facilitate natural daylight penetration and to comply with Swiss wind/snow loads

Shout it from the rooftops

The big news in distributed, utility-interactive PV, though, is that "rooftop" need no longer be the operative word – at least not in the sense that PV hardware has to take the shape of retrofit systems, requiring integration into architectural schemes that are at best indifferent and at worst inhospitable to their addition. The era of building-integrated photovoltaics (BIPV) has arrived, heralded by the first generation of PV components that can substitute for conventional building materials and expand, rather than circumscribe, the possibilities of solar architecture.

Development of BIPV components is proceeding in three main areas: integral roof modules – which replace traditional roofing systems; roofing tiles and shingles; and integral modules for vertical curtain-wall facades.

In 1980, Solar Design Associates (SDA) worked with Mobil Solar Energy Corporation to create the first large area (1.2 metres by 1.8 metres) glass-superstrate PV module with the structural integrity to replace conventional roofing materials in residential and light commercial sloped-roof construction. Over the past two decades this module has been used successfully in both new construction and retrofit applications.

Solarex Corporation of Frederick, Maryland, US has more recently introduced large-area, polycrystalline frameless laminate PV modules suitable for facade as well as sloped-roof integration. The natatorium built for the 1996 Atlanta Olympic Games complex (now on the campus of Georgia Institute of Technology – see below) features a glass entry canopy constructed of these BIPV components. The structure's roof features a 348 kWp PV array – the largest of its kind in the world.

Development of PV roofing tiles and shingles is largely concentrated in Japan, where over 90 percent of residences have tile roofs. Sanyo Corporation has used amorphous silicon to create both traditionally curved and flat PV shingles, the latter measuring approximately one metre by half a metre, half of which area is active electricity-generating surface. In Europe, the German firm Pilkington Solar and the Swiss company Solution have developed BIPV component systems for commercial building walls.

The future's so bright

The acceleration of BIPV's acceptance will depend as much upon advances in public policy and planning foresight as on technology. The technological innovations are well under way, as witness the new generation of PV modules which incorporate their own air-conditioning conversion capability, eliminating the need for bulky, complicated external DC-AC inverters. The next decade holds the promise of "thin-film" module surface materials,

CASE STUDIES

Olympian endeavour

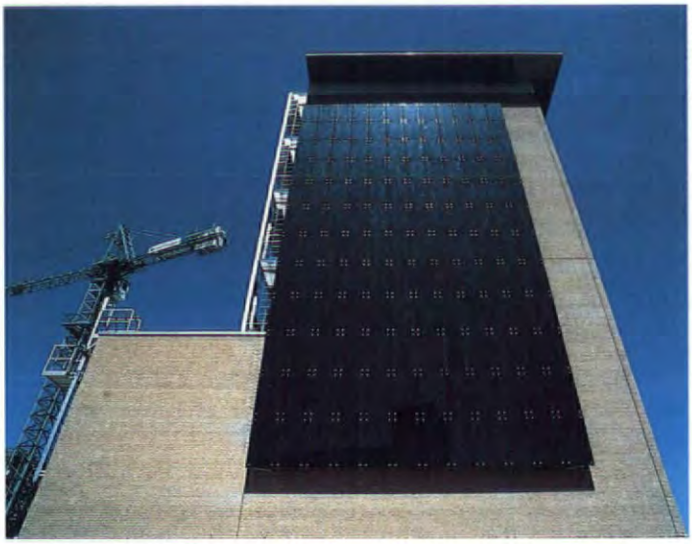
Whiting-Turner Contracting Co, Georgia, USA

The world's largest single solar-powered energy system connected to a power grid kept the sweltering heat off participants in the swimming and diving competitions at the Atlanta Olympics two years ago. Designed by Georgia Power Company, in association with the US Department of Energy, the 348 kilowatt, 6,000-square-metre barrel-vaulted structure generates enough energy to power 28 houses every day. Rosser International carried out the engineering design.

Weathering well

Cannon, New York, USA

For the new Center for Environmental Sciences and Technology Management at the State University of New York in Albany Cannon developed an energy-conscious design strategy that included the integration of solar electric systems into both the building and the project site. The building incorporates 15 kWp custom PV modules in building-integrated sunshades that support the PV while reducing cooling loads and glare. The PV modules feature module integrated inverters.



© UBS Switzerland

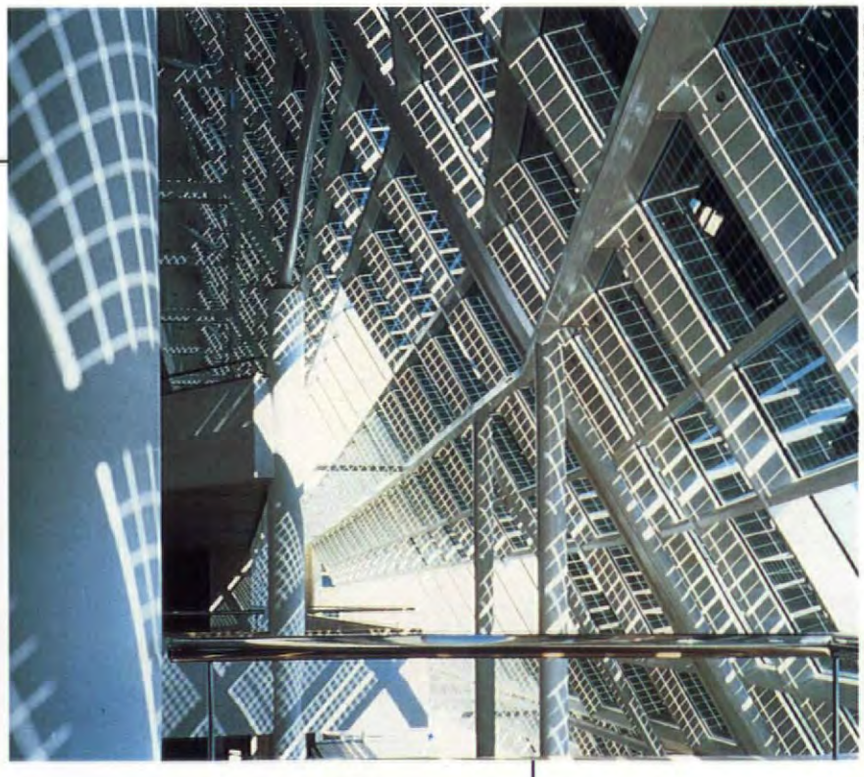
Left:
Nearly 50 percent of the PV generating capacity of UBS bank's new office building in Lugano, Switzerland is located on the structure's facade; thereby enhancing the building's green credentials and supporting the primary PV system on the roof

which will generate solar electricity at a greatly reduced cost, and with less energy invested in production. In the past 15 years alone, PV costs have fallen from roughly US$8.50 to US$4.25 per peak Watt, with a further halving likely by 2010.

On the policy and planning fronts, widespread implementation of BIPV will benefit from continued assessment of "candidate space" for integrated modules in urban areas; and from development of uniform interconnection standards and net metering structures. Enlightened tax policies are particularly important: a tremendous impetus to BIPV growth is the attractiveness of shortened depreciation schedules on building skin components which are, in effect, energy-generating facilities. Nor should we overlook promotion tools such as the American Institute of Architects' recently announced graduate-level BIPV curriculum package – short courses for practicing professionals and national design competitions.

Building-integrated photovoltaics introduces a whole new palette of materials for design architects, an entire range of opportunities for creating buildings with radically new multi-function "organic" components rather than dutifully tacking on – and, perhaps, just as dutifully concealing – hardware that might be socially responsible, but has all too often been regarded as the aesthetic equivalent of cod liver oil by the design community. The BIPV promise unites environmental responsibility, freedom of design, and the chance to displace the costs of conventional materials. In the bargain, it offers the chance to turn buildings into living, cooperative power producers rather than dead loads, in which the meter turns only one way. WA

Steven Strong is president of building-integrated photovoly firm Solar Design Associates.



Photographs Dennis Gilbert

SPECULATE TO INTEGRATE

Studio E Architects, London, UK

The Solar Office at Doxford International Business Park, near Sunderland, UK, is the first speculatively constructed building to incorporate building-integrated photovoltaics. The 900-square-metre facade is the world's largest. Doxford is also one of only a few buildings to incorporate an holistic energy strategy – it is designed to use as little energy as possible, whilst its enclosing envelope replaces the energy that is used. The 73 kWp photovoltaic array is south facing, and inclined at 60 degrees for maximum exposure.

OnScreen

AutoDesk's acquisition of Discreet Logic combines the creative potential of 3D Studio Max with Discreet's paint and composition software

Discretion is the better part of AutoDesk

In a move that's surprised many in the industry AutoDesk, developer of AutoCAD and parent company of Kinetix (see OnScreen *WA*69 and Products in this issue), has bought Discreet Logic, developer of high-end video effects software for a very reasonable US$550 million.

Kinetix has been working with Discreet Logic for several months to integrate the Modelling capability of 3D Studio Max with Discreet Logic's paint and composition software. The process led to the on-the-fly linking of Max and Paint – models created in Max can have textures created in Paint placed on them.

The acquisition will mean a new name for Kinetix and a redefining of the company's role. Discreet, as the new company is known, will certainly be in a much stronger position to capitalise on the recent success of Max in the entertainment industry. It was used in the recent Hollywood blockbuster "Lost In Space" for example.

Commenting on the move, Carol Bartz, AutoDesk chairperson and CEO said, "with this acquisition, we are executing our strategy to broaden our business and expand beyond the traditional design software category".

It is not clear how the move will affect the large number of architectural users of Kinetix products. While Max will still be used on visualisation schemes, its stablemate Viz may have a limited life as a stand alone product. The two applications are built from the same code base but as Discreet's area of expertise moves more and more into entertainment, current Viz users may be better served if Viz is incorporated into a future release of AutoCAD.

www.autodesk.com. Tel: +44 1483 303322

Graphisoft's virtual building helped communicate design details and the company's ideas to clients and tenants at the new Graphisoft technology park in Budapest

Graphisoft find self-belief turns a profit

Some companies might balk at the prospect of having to practice what they preach in order to impress clients and tenants. But when Graphisoft, developer of ArchiCAD, relocated to its new seven-hectare headquarters, Graphisoft Park in Budapest earlier in the year, that is exactly what happened.

The methods used to design and lease the buildings on the park – financed entirely from the company's pre-IPO retained earnings – are unique. Using ArchiCAD, a three-dimensional computer model of a "virtual building" was developed and maintained by Graphisoft's architects to communicate ideas to clients; explore design details; improve client's productivity, and deliver the animations, renderings and virtual reality scenes required for leasing. The park will house dozens of tenant software companies, including Microsoft Hungary.

"There was really no question about it," said Graphisoft's Péter Hornung, who manages the project. "We were convinced that the effort to develop and maintain a 3D model of our buildings would offer immediate payback, and it has."

Go for the easy life with LT Architect

British software developer, CADlogic has come to the aid of architectural LT users. The release of LT Architect (US$810) adds architectural functionality to basic LT, automating mundane tasks such as the placement of windows and doors or the creation of cavity walls.

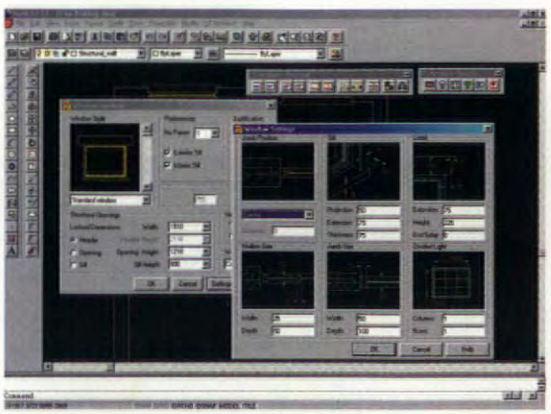
Unlike AutoCAD, LT does not provide easy hooks onto which developers can hang additional software. CADlogic got round this limitation by utilising functionality within the Windows operating system and the use of Macros.

While still a far cry from Architectural Desktop, LT Architect does make LT a much more productive tool. The inclusion of parametric Doors and Windows along with some parametric symbol libraries makes things a great deal quicker. Sections and elevations can be generated for plan information and edited to match your exact requirements.

LT Architect doesn't do anything you can't already do, it just makes it a lot easier.

Download the evaluation software at: www.ltarchitect.com

LT Architect – quicker and easier to use than any architectural LT system



OnScreen is compiled by Richard Spöhrer, writer and creative director of hyper-M, multimedia and visualisation consultant. He can be contacted via WA*, or tel: +44 181 662 0075. e-mail: hyper-m@dial.pipex.com*

Polemic

Dithering in space

Mexico City is enormous, one of a number of world cities running headlong into populations in the 20 millions. But currently its citizens are concerned with another matter: the fate of the Zocalo, the great 77,000-square-metre public square in the centre of the city that at present is paved in concrete and decorated solely by a tremendously tall steel flagpole in its centre. The controversy arose last summer in connection with a plan backed by the newly elected mayor to break up the concrete and plant the square with trees. The mayor and his city council were already empowered to put this plan into effect, but they hesitated. Government politicians also were undecided, as were their planning and environmental consultants. A public participation exercise produced a majority of three-to-one in favour of the trees, but still the political divisions intensified, each faction fielding its own experts. Forestry specialists insisted that Mexico City's notoriously poor air quality would guarantee failure: opposition politicians claimed that the real reason for the scheme was to put a stop to political demonstrations in a place where as many as 30 protest rallies a day have been held in the past. Deadlock has been the outcome, in the shape of a hastily arranged landscape design competition intended to produce a winner by Christmas.

Several thousand miles away from the Zocalo, another argument raged over public open space in another city. In London a scheme developed by the distinguished architect Sir Norman Foster called for the progressive enlargement and pedestrianisation of Trafalgar Square and Parliament Square and the streets linking them. Both squares are presently mixed use areas, penetrated by heavily used traffic routes.

Schemes put forward before had always been based either on traffic priority, with pedestrian tunnels linking the open spaces or, more recently, on traffic restrictions and checkpoints to prevent unauthorised vehicles from penetrating the government district for a terrorist attack. This time the project was intended to be permanent. Under the benign title "World Squares for All" it was presented as a pioneering step in de-trafficking the city. While the earlier anti-terrorist measures were still present, they were submerged in the general discouragement of private cars, encouragement of cycling and the introduction of new developments in public transport. At an estimated cost of nearly US$100 million this project too was put out to public consultation and, as with the trees of the Zocalo, came back with solid majority approval. Nonetheless a planning application laid before the authorities was rejected on the grounds that such a drastic scheme would throw an unacceptable traffic burden onto surrounding areas. There matters came to rest in an apparent deadlock until late August when the deputy prime minister suddenly announced his own support for the scheme and the prospect of funding it through the national lottery was mentioned.

It was at this point that serious opposition arose for the first time. Local councillors protested that the scheme would benefit only tourists at the expense of those working and living in London. Others endeavoured to show that the sheer volume of traffic to be re-routed would defeat the object of transferring travellers from cars to buses and bicycles. Evidence was put forward showing that increases in the number of buses would soon reach a point of diminishing returns by recreating the traffic problem formerly caused by cars and trucks. The predicted invasion of bicycles too caused disquiet. Evidence was advanced to show that the recent banning of cyclists from London's parks had been forced upon the Parks Agency by the alarming increase in collisions between cyclists and pedestrians in recent years. One authority even cited the example of China where bicycles are licensed and cities impose limits on the number of bicycle permits issued. Considered as a means of transport, bicycles require more road space per rider than any form of mass transit, which is why Chinese cities look forward to increasing the proportion of motor vehicles rather than the reverse.

Whether these arguments can yet drive the World Squares project back to the drawing board is as unclear as the status of the landscaping competition for the Zocalo. What is evident in more than one great city of the world is that there is a tremendous will towards urban transformation, so as to make the city somehow work better – but also intense controversy over how this should be done and whose interests will ultimately be served by it. And in part this uncertainty stems from the increasing presence in those same cities of two separate populations that look like one.

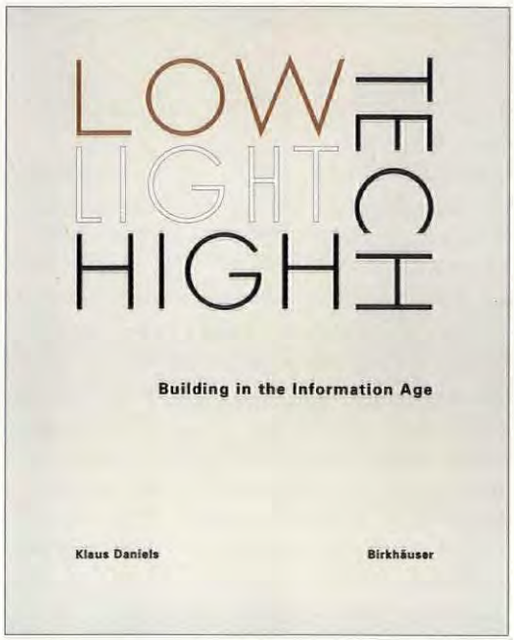
Tourists for example may look like citizens, but they are not. More correctly their presence disguises the extent to which indigenous commerce and industry no longer exist. In this sense, particularly where public open spaces are concerned, tourists are a form of camouflage that hides an urban emptiness. Yet to accommodate these tourists traffic lanes are lost and traffic congestion is increased – in Trafalgar Square for example more than half the buses counted in a traffic census last summer were tour coaches. The tourist industry exerts enormous influence over urban policy. In Britain it successfully lobbied for government measures to expel beggars from city streets because foreign visitors reacted negatively to their presence.

Tourism is a complex paralyser of urban change. Over the years most city buildings have been rebuilt as air conditioned offices although their external appearance seldom reflects this change. In consequence what are in effect "fictional" facades are what visiting tourists take for fact. Perhaps such misconceptions play a part in all the arguments over pedestrianisation, tree planting and theme parking that loom so large in city politics. If they do, then the hesitation in the face of heroic urban surgery that they cause is a form of collaboration with unreality, for even as we debate what to do with squares, parks and traffic, our cities are becoming works of fiction in themselves.

Martin Pawley

"Where public open spaces are concerned, tourists are a form of camouflage that hides an urban emptiness. The tourist industry exerts enormous influence over urban policy."

Book Reviews



Inquire within upon everything

Low-Tech Light-Tech High-Tech: Building in the Information Age. Klaus Daniels. Translated into English by Elizabeth Schwaiger. Birkhäuser, Basel, Switzerland. 238pp, 180 colour and b&w illustrations, 300 line drawings. SFr88/DM98/US$69/£44

Reviewed by Martin Pawley

By dint of dispensing with such traditional fripperies as punctuation, narrative and linear layout this book contrives to have it all – especially in its title. Inside, numbered paragraphs like those in a fax machine manual, guide the reader from the present time of crisis deep into the next century. Plunge into the text itself though and you are brought up short by a regiment of revisionist definitions designed at once to make the title's gigantic subject range more manageable and to disqualify the competition.

"Low-Tech" is generously defined as building design with maximum use of natural resources. "Light-Tech" becomes designing for maximum resource efficiency. While "the information age" of the subtitle vanishes altogether, only to reappear under the heading of "High-Tech", which is daringly redefined as anything that "symbolises the impact of future information and communication systems on architecture".

Further on we not only learn that "intelligent buildings" should really be called "intelligently designed and operated buildings", but discover that henceforth buildings should not be called buildings at all, but "flexible real estate objects".

As a result of these drastic linguistic adjustments, by page seven the broad sweep of Daniels' canvas has come down to a handy, no-nonsense book about building efficiently with natural resources in what is translated as "dense, planted urban environments" whilst keeping a wary eye on information technology. Far from challenging the Cosmos, this is of course right on track for the conventional wisdom awards of 1998, and indeed numerous professors are thanked in the acknowledgments. It is only later, as we make our way deeper into his "dense, planted" pages of tables, charts and small photographs that we become slightly worried about how on-message Daniels is with his unshakeable self-confidence, which at times verges on the overwhelming. For example, as if unaware of the "bottom up" drive for development that has been taking place in developing countries over the last half century, he predicts a big role for architects and urban planners in managing it in future, especially in the world's mega-cities. Nor does he think the information age will be much help. A few paragraphs further on he dismisses the decentralising effects of virtual reality which "cannot replace real life because social contact and interaction would be lost". After a few more pages we are reminded that, "never-ending luxury, consumption and pleasure no longer deliver the satisfaction they once promised". Then, "excessive stimulants will be excluded from homes". And finally, "sensual experience knows no ersatz".

Browsing rather than reading, one might travel a long way into this bizarre collection of statistics, homilies, challenges and personal disappointments (Daniels is particularly bitter about the Internet), before realising that, despite its forbiddingly technical appearance, this is not really an authoritative publication. More accurately it can be described as a period piece. A snapshot of the chaotic state of architectural theory at the close of the twentieth century. A cornucopia of deeply fascinating hearsay, wild speculation, propaganda, prejudice and fear, laid out to look like science.

Martin Pawley architect, critic and writer is consultant editor of WA.

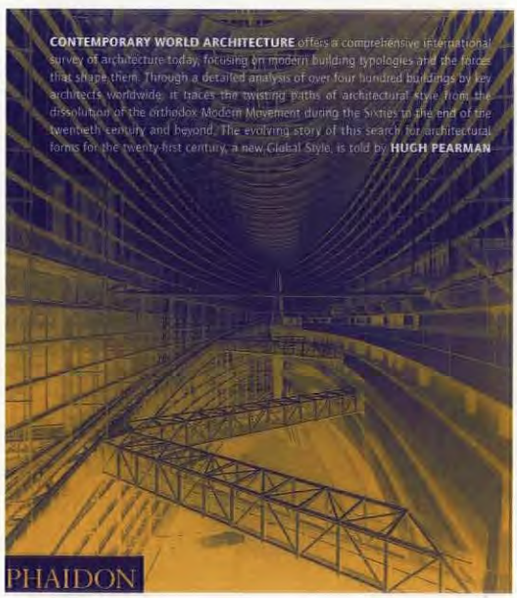
Holding up under pressure

Contemporary World Architecture. Hugh Pearman. Phaidon Press Ltd, London, UK. 512pp, 1,000 colour and 211 b&w illustrations. £59.95/US$89.95 (hardback)

Reviewed by Michael Horsham

Brick-like survey books have an inherent problem which goes beyond the physical demands of finding a binding strong enough to hold them together. The binders, thankfully have taken care of the engineering side of things – ie the book hasn't fallen apart yet. Fortunately, too, Pearman has managed to address the prime intellectual difficulties in compiling a book which lacks the opportunity to put forward a strong central thesis. But, the lack of a single authorial point to the book need not be seen as a minus. This is a broad survey, which tries to make sense of 20 years' worth of global architectural change, so in other ways, more important than the physical fact of the binding, the book defies the logic of its own form and holds together pretty well.

The subject he has chosen to tackle is vast and varied. Architecture outside of the single family dwelling has, in the last 30 years, become driven by considerations other than the abilities, vanities and predilections of developers, banks and corporations. In short, Pearman rightly identifies a number of trends which have seen for example, the art gallery change its status from simply a locus of local civic pride, to both a symbol of the international valency of any city and a lure to international travellers. But this is a book which text wise, and in spite of the odd over-generalisation, at least plays continually to its strengths, and the predominant characteristic is Pearman's striving to contextualise information with at least some historical and contemporary perspective.



If I have a criticism of this 512 page monster of a book it is not with the indexing, the bibliography, the quality of the information or the typography. No, my beef is with the use and deployment of at least some of the images. The costs and research involved in getting these big books together are often located in securing good images of the buildings in question. While, by and large, the images are of a decent quality and are used well there seems to be something of a mismatch in the decisions that have been made in terms of which images to reproduce large and which to reproduce small. There are an irritating number of images of interesting buildings which are reproduced at a scale at which the reader has to struggle to understand. Equally, some of the larger images no doubt looked good on the light box but have the qualities of painterly nocturnes rather than documentary photographs.

But this is a relatively minor complaint in a book which manages to transcend its enforced generalism and come across as a useful and well researched, even authoritative guide to what has occurred in architecture in recent times. The neat division into 13 sections including visual arts, workplace, transport, sport and towers is a clever approach to the problem of thematising what could have been a messy problem. In addressing this multiplicity of subjects the book has to try hard to escape from a feeling which lurks in the background that this is 13 smaller survey books stuck together. By and large, it succeeds.

Michael Horsham is a London-based design consultant and critic.

Blowing hot and cold

Natural Ventilation in Buildings: A Design Handbook. Edited by Francis Allard. James & James Ltd, London, UK. 368pp, illustrated throughout. £50/US$75 (hardback)

Reviewed by Peter Wislocki

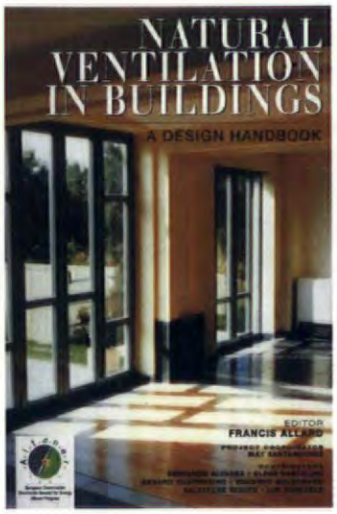
This is an exceptionally well researched book on a subject of great importance and some controversy. Natural ventilation is politically correct, yet widely resisted by architects, engineers and clients – a good thing in principle, but problematic in practice. Part of the problem is that – as is acknowledged in Allard's book – natural ventilation is seldom understood within "holistic" design. Whereas structural engineers and architects largely share an intuitive grasp of space, enclosure and structure, environmental science remains the domain of mathematicians, taught in schools of architecture by those with little or no architectural training, as a tangential element of the curriculum. Given the complexities and risks associated with natural ventilation, it is hardly surprising that engineers feel more comfortable specifying air conditioning systems; and developers, particularly in Britain and North America, will scarcely contemplate schemes without the ubiquitous four-pipe fancoil equipment.

With funding from the European Commission, one might have expected this *Design Handbook* to present its wealth of information with the objective of demonstrating the practical potential of energy-saving, naturally ventilated designs. But as an exercise in converting the sceptics, Allard *et al* appear to have adopted a strategy of blinding with science. Politicians know that, in order to persuade, they must first empathise. Lay readers, unfortunately, will find little with which to empathise in the second chapter, on "The Fundamentals of Natural Ventilation", packed with over 100 equations (of bewildering complexity), and dozens of graphs, charts and tables of data. This is authoritative stuff, and might have been usefully presented in appendices, but to most practising architects it is entirely opaque.

Chapter three, on predictive methods, is a slightly easier read, describing various empirical models by which paper designs can be evaluated; and the fourth chapter, on monitoring techniques, is almost straightforward, if still quite specialised. Only in the fifth chapter will non-experts begin to find material of a more accessible nature, including an apparently objective discussion of the numerous reasons why natural ventilation may not always be the best solution. Allard *et al* acknowledge that "natural ventilation involves acceptance of a certain degree of fluctuation of the indoor conditions, which could be a risk for a designer, who might be held liable by a dissatisfied customer".

The penultimate chapter presents a fascinating historical overview of supposedly successful, naturally ventilated buildings, from Iranian wind towers to Norman Foster's Duisburg projects. The book concludes with a number of contemporary case studies scientifically appraised.

Depressingly for those of us who would like to think the "holistic" design approach which the book advocates should produce buildings which combine energy efficiency with wider architectural merit, the evidence of the case



studies suggests otherwise. Of the featured buildings, only Jourda and Perraudin's Lyon school of architecture could be described as architecturally distinguished – and it is only this building which is found to be a resounding environmental failure.

Peter Wislocki, architect and critic, is a regular contributor to WA.

BOOKS RECEIVED

Revolutions of Form: Cuba's Forgotten Schools of Architecture

John A Loomis. Princeton Architectural Press, New York, USA. 200pp, 30 colour and 75 b&w illustrations. US$27.50/£19.95 (paperback)

Environmentally Friendly Cities

Edited by Professors Eduardo Maldonado and Simos Yannas. James & James, London, UK. 704pp, illustrated throughout. £65/US$105 (paperback)

Housing: New Alternatives, New Systems

Manuel Gausa Navarro. Birkhäuser, Basel, Switzerland. 272pp, 300 colour and 500 b&w illustrations. SFr68 (hardback)

Human Spaces – Life Enhancing Designs for Healing, Working and Living

Barbara Crisp. Rockport Publishers Gloucester, MA, USA. 192pp, 300 colour illustrations. US$50 (hardback)

Pierre Koenig

James Steele and James Steele. Phaidon Press Ltd, London, UK. 160pp, 150 colour and 100 b&w illustrations. £29.95/US$45 (hardback)

Events

Lectures, congresses and conferences

Austria

Sixth Vienna Achitectural Congress

This year's title is "*Wo Wohnen Wir* – Where Will We Live.". The congress will look at different societies' traditional views of "home". Speakers, including Ben van Berkel and Jean Phillipe Vassal, will approach the question from political, social and creative viewpoints. From 13-15 November 1998 at the Architektur Zentrum, Museumsquartier, Museumsplatz 1, A - 1070, Vienna.
Tel: +43 1 522 31 15
Fax: +43 1 522 31 17

Canada

16th Annual International Conference on Urban Waterfront Planning, Development and Culture

The theme of this year's conference is "Developing Distinctiveness – Countering Formulas, Fads and Flummery". Runs from 12-14 November 1998 at the Royal York Hotel, Toronto, Ontario, Canada. Contact the Waterfront Center, 1622 Wisconsin Avenue, NW Washington DC 20007, USA.
Tel: +1 202 337 0356
Fax: +1 202 625 1654
e-mail: waterfront@mindspring.com

France

Third Colloque International – Habiter La Ville Méditerranéenne

Third in a series of biennial congresses examining the identity of the Mediterranean town. This year's focus is the relationship between public space and private living space. Takes place from 19-21 November 1998 at the Montpellier School of Architecture, 179 Rue de l'Esperou, 34093 Montpellier, Cedex 5.
Tel: +33 4 67 01 89 89
Fax: +33 4 67 41 35 07

USA

Hiring and Keeping the Best Architectural Talent

Conference which will bring together nine leading architectural and engineering business people to share their proven strategies in the field of recruitment. The event has been designed exclusively for owners, prinipals and human resources managers of architectural and engineering firms. Takes place at the Don Cesar Beach Resort, St Petersburg, Florida, on 4 December 1998. For more information contact PMSJ Resources Inc, 10 Midland Avenue, Newton, MA 02458.
Tel: +1 800 537 7765
Fax: +1 617 965 5152

Malaysia: The Tall Building and the City – The State of the Art for the Millennium

Conference from 3-5 May 1999 in Kuala Lumpur. The main attraction will be the Petronas Twin Towers, currently the tallest buildings in the world. Sponsored by the Council on Tall Buildings and Urban Habitat and the Sultan Iskandar of Urban Habitat and Highrise. For more information contact The Secretariat, ICTBUH '99, Institute Sultan Iskandar, University of Teknologi Malaysia, Jalan Semarak, 54100, Kuala Lumpur. Fax: +60 3 294 0293 e-mail: isikl@klred.utm.my

Architecture and design competitions

UK

AIA London Fifth Annual Excellence in Design Awards

Architecture awards whose sole judging criteria is "design excellence". Welcomes entries of new build architecture, rehabilitation, interior design and monument design. Entry deadline, 15 January 1999. Enquiries by post to AIA Design Awards, Kent House, 14-17 Market Place, London W1N 7AJ.
Fax: +44 171 636 1987

The Young Architect of the Year Award

Award aiming to recognise the best of emerging UK architectural talent, open to architects aged 35 or under. The judging panel includes Sir Norman Foster. First prize is US$8,200 (£5,000). Closing date for entries is 27 November 1998.
For information call:
Tel: +44 171 861 6467

USA

Cyborg City: Mechanical Islands for New York

International ideas competition opening up the debate about the development of artificial islands in New York's river and sea bays. Competition open to practitioners who completed their terminal university degree during the past ten years, students of architecture, urban design, landscape and interior design. Awards of US$3,000 (plus grants) are offered. Registration by 15 November 1998. Deadline for entries 25 February 1999. Contact Livio Dimitriu at Ten West Fifteenth Street, Suite 1126. New York City, New York 10011-6826.
Tel: +1 212 727 2157
Fax: +1 212 727 2159
e-mail: Ldusainst@aol.com

Fabstruct 1999

Student design challenge sponsored by *Fabric & Architecture* magazine, calls for the design of a hypothetical International Student Centre to open on the eve of the new millennium. The building should be a membrane structure, which may be a tent, air or tensile structure, or something new entirely. The entry deadline is 4 December 1998. Contact Arik Hanson at *Fabric & Architecture*.
Tel: +1 651 225 6937
Fax: +1 651 225 6966
e-mail: achanson@ifai.com

Exhibitions

Canada

Photography and Transformations of the Contemporary City: Venezia-Marghera

Exhibition looking at the worldwide phenomenon of the abandonment of heavy industrial zones on the edges of cities, focusing on Porto Marghera in Venice, Italy, which is soon to be extensively re-developed. From 9 December 1998 to 25 April 1999 at the Canadian Centre for Architecture, 1920 rue Baille, Montreal, Quebec H3H 2S6.
Tel +1 514 939 7026
Web: http//www.cca.qc.ca

Japan

Charlotte Perriand, Pioneer of the Twentieth Century

Retrospective exhibition of the former collaborator of Le Corbusier, placed under the patronage of the International Union of Architects. At the Living Design Centre, Tokyo until 3 November 1998.
Tel: +81 3 53 22 65 00
Fax: +81 3 53 22 65 01

The Netherlands

Living Bridges

Exhibition at the Nederlands Archtectuurinstitute, coinciding with the opening events of the R'Festivals 1998 programme. "Living Bridges" looks at inhabited bridges from medieval times to the present day. The exhibition incorporates a range of activities, including a bridge design competition. Until 29 November at the Nederlands Architectuurinstitute, Museumpark 25, 3015 CB Rotterdam.
Tel: +31 10 4401200
Fax: +31 10 4366975
e-mail: info@nal.nl

Austria: Living – Reading, Rem Koolhaas and Bruce Mau

Exhibition presenting the Office for Metropolitan Architecture's vision of "Living", looking at five separate OMA-designed houses. Also includes the work of OMA collaborator Bruce Mau. Runs until 16 November 1998 at the Architektur Zentrum, Museumsquartier, Museumsplatz 1, A - 1070, Vienna.
Tel: +43 1 522 31 15 Fax: +43 1 522 31 17

UK

The Work of Charles and Ray Eames
The first UK exhibition of the work of husband and wife design team. Runs until 3 January 1999 at the Design Museum, Shad Thames, London, SE21 2YD.
Tel: +44 171 403 6933
Fax: +44 171 378 6540

Architecture Week
The UK's national festival of contemporary architecture .A programme of events will include exhibitions, talks, debates and new initiatives focusing on the people and processes that shape the environment in Britain. Runs from 12-19 November 1998, coinciding with the Stirling Prize award. Further information:
Tel: +44 171 251 9112
Fax: +44 171 490 5757

Alvar Aalto: Process and Culture
Exhibition mounted as part of the celebrations of the centenary of Alvar Aalto's birth, focussing on a single masterwork, The House of Culture in Helsinki. From 5 November 1998 to 19 December 1998 at the RIBA Heinz Gallery, 21 Portman Square, London W1H 9HF.
Tel: +44 171 307 3628
Fax: +44 171 486 3797

USA

The East River Exhibition
A large-scale exhibition of projects entered in the Van Alen Institute's "Design Ideas for New York's Other River" competition. Features models, renderings, competition boards and sketchbooks from the best submissions from the competition, as well as the work of the Institute's design fellows. From 21 October 1998 to 1 February 1999 at the Van Alen Institute, 30 West 22 Street, New York, NY10010.
Tel: +1 212 294 7000
Fax: +1 212 366 5836

Japan 2000: Kisho Kurokawa
Organised by the Royal Institute of British Architects, the exhibition examines the work of Kisho Kurokawa and his influence on Japanese design. From 17 October 1998 to 3 January 1999. For information contact The Art Institute of Chicago, 111 South Michigan Avenue, Chicago, Illinois 60603-6110.
Tel: +1 312 443 3600
Fax + 1 312 443 0849

Trade shows

France

Equip'Baie 1998
Biennial trade exhibition for windows, doors, shutters, locks, ironmongery and solar protection. This year sees the introduction of "Windows Forum" – a series of talks by leading architects and designers. Runs from 18-21 November 1998 at the Parc des Expositions, Porte de Versailles, Paris. Contact Helen Cockbill at Miller Freeman PLC, Blenheim House, 630 Chiswick High Road, London W4 5BG, UK.
Tel: +44 181 987 7598
Fax: +44 181 742 8116

Mapic 98
International property trade show for developers, property advisors and managers and owners of retail sites. Takes place at the Palais de Festivals, Cannes, from 12 - 14 November 1998. For information contact the Reed Midem Organisation, BP 572, 11 rue du Colonel Pierre Avia, 75726 Paris, Cedex 15.
Tel: +33 1 41 90 45 20
Fax: +33 1 41 90 45 30

The Philippines

Philconstruct 1998
Wide-ranging construction show, part of the "Philipines Mega Infrastructure Show" programme. Features the 'Technology Forum" – a seminar on new methodologies and systems. Runs from 18-21 November 1998 at the World Trade Centre Metro Manila. Contact CONVEX International for information at Unit 705 Annapolis Wilshire Plaza, 11 Annapolis Street, Greenhills, San Juan, Metro Manila.
Tel: +632 844 4059

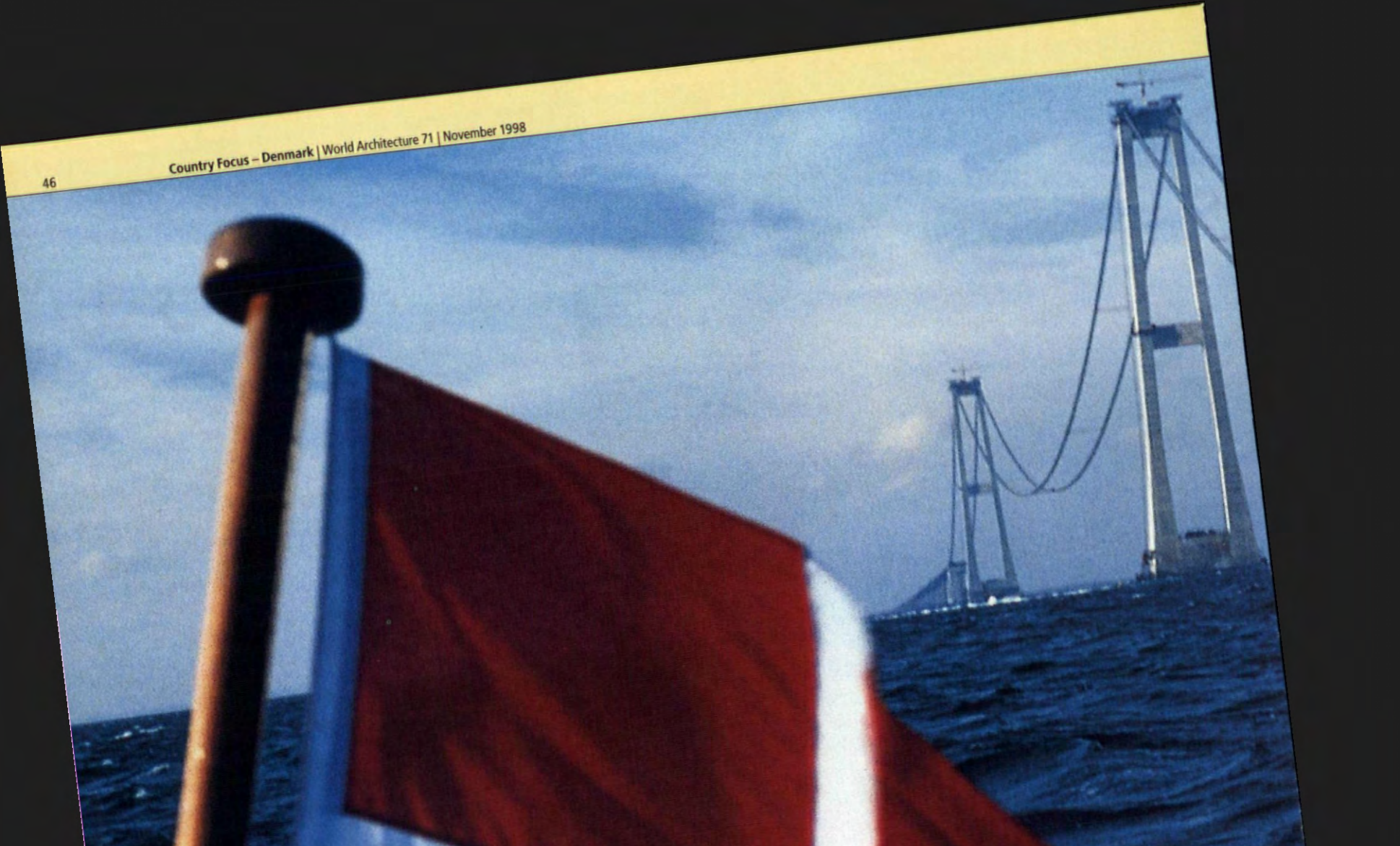
Russia

Mosbuild Batimat 99
The fifth Moscow International Building and Construction Exhibition. Runs in conjunction with Ceramica Moscow '99 (building) and Interiors Moscow '99 (interiors, furnishings and finishes) at the Krasnaya Presnya Expo Centre, Moscow. For details contact the ITE Group, Byron House, 112a Shirland Road, London W9 2EQ, UK.
Tel: +44 171 286 9720
Fax: +44 171 286 0177

Fidexpo/Expofurn & Lighting
International exhibition of furntiure, lighting and furniture supplies. From 18-22 February 1999 at the Lenexpo Exhibiton Centre, St Petersburg. For further information contact the ITE Group (see Mosbuild Batimat 99, Russia).
Tel: +44 171 286 9720
Fax: +44 171 286 0177

USA

International Commercial Construction Exhibition
Trade show expecting an attendance of 15,000 building industry professionals. Shares the floor with the International Builders' Show which hopes to pull in another 70,000. Includes building materials, HVAC, & construction equipment. At the Dallas Convention Centre Arena, Dallas, Texas, between 15-18 January 1999. For information call Ignacio Cabrera at the ICCN Exposition Department.
Tel: +1 800 368 5242
Fax: +1 202 887 8032



Denmark

Country Focus

Helle Bay presents an overview of construction in Denmark that refutes the gloomy predictions of a decrease in activity on completion of the Great Belt Link in June this year. Unlike many of their European neighbours Denmark's architects, particularly in the capital of Copenhagen, are benefiting from a demand for commercial building which is 15 percent higher than supply. Although involvement from foreign architects is less usual than elsewhere in Europe, many have participated in the new urban development of Ørestaden in the Øresund region, an example of Denmark's desire to maintain the emphasis on regional, rather than national, growth.

The Great Belt Link with the Danish flag in the foreground

Denmark has enjoyed massive economic growth since 1993. The economic boom was partly caused by a drop in interest rates, which brought about a reduction in taxation and prompted home owners to remortgage their houses. At the same time, there was a dramatic increase in demand for home ownership - particularly for Denmark's one million privately owned single-family homes – which triggered a 60 percent rise in their cost. Building new homes became a competitive option and developers built 7000 new single-family homes in 1997 and are expected to build 9,000 this year. The figure for 1992 was 1,900. A reduction in interest rates together with taxation and rising house prices created a rise in wealth and private spending, and stimulated a general boom in the building sector, creating 180,000 new jobs and US$14,9 billion (103 billion Danish krona) worth of business in 1997. Of this US$6 billion (41.7 billion Danish krona) was spent on housing.

"A 20 percent tax was imposed on national and public utility building in 1997 which called a halt to building activity in these sectors."

For the Social Democratic Government, however, the economy was overheating. The increase in spending caused the trade surplus to fall from US$4.3 billion (30 billion Danish krona) in 1993 to US$1 billion (7 billion Danish krona) in 1997. The Government therefore adopted a range of restrictive measures directed at the building sector. A 20 percent tax was imposed on national and public utility building which, to all intents and purposes, called a halt to building activity in these sectors. Only municipal housing and housing for the elderly were exempt.

These restrictive measures were followed-up in June 1998 by further economic constraints to bring private spending under control. The measures were aimed at maintaining the low rate of inflation, a stable economy, good growth in employment and to keep the trade surplus under control and close to "the magic zero". The reduction in interest allowance, which has been the highest in Europe, will have the greatest effect on the building sector. It will be reduced from 46.4 percent to 32.4 percent during the next four years. Borrowing money will become more expensive. The alternative to these measures, according to the Government, would be a huge reduction in public spending and no improvements in the health sector, care for the elderly and schools.

The latest economic measures are expected to bring about a reduction of around 15 percent in house prices. Says Chief Economist Jesper Nielsen of the Danish Building Employers Confederation: "I fear that we will experience a repetition of what happened in 1986, when interest allowance also was reduced. Many people went deep into debt and personal bankruptcy. This triggered a downward economic spiral. When one sector is badly hit, it affects other sectors and causes bankruptcy in the building sector, in a kind of domino effect. The 1986 measures brought about a dramatic fall in the price of houses and unemployment increased from 140,000 to 360,000." Many estate agents, however, anticipate general stagnation rather than a drop in prices.

The reduction in interest allowance signals that in the long term the Government wants to increase taxation on housing in order to decrease taxation on goods and earnings. At 62.1 percent Denmark has the highest marginal rate of taxation for above-average earners in the entire OECD area. Rising competition in the EU might also make it difficult to maintain a VAT of 25 percent. The building sector expects an increase in taxation, because unlike labour, property cannot be moved abroad.

On the other hand, commercial building may experience a boom. Demand is 15 percent higher than supply. Copenhagen is

COUNTRY FACTFILE – DENMARK provided by Hanscomb

The land: Denmark, the smallest of the Scandinavian countries, has an area of 43,094 square kilometres. This excludes two self-governing territories: the Faroe Islands, which are 21 volcanic islands, and Greenland. Denmark includes the Jutland Peninsula and over 450 islands, so it is almost surrounded by water. Most of the islands are small, but there are a few larger islands. The principal islands are Sjælland, Fyn, Lolland, Falster, and Bornholm. Denmark's only land border is with Germany to the south. Its seacoast, about 7,400 kilometres, adjoins the North Sea to the west, Skagerrak Straits to the north, Kattegat Straits and Øresund to the east, and the South Baltic Sea to the south-east.

There are no mountains in Denmark, only gently rolling hills and plains. The highest point is Ejer Bavnehøj (173 metres) in south-eastern Jutland. There are five geographic regions:

- Dune Coast along most of the western coast, which has white sandy dunes, but marshes in the south.
- Sand Plains in the west, which are almost flat.
- East-Central Hills, which is the largest land region including most of Jutland and the nearby islands.
- Northern Flat Plains, which were once part of the sea.
- Bornhom Island, which has the only granite rock in Denmark.

Climate: Denmark has a mild and damp European marine climate. It is fairly uniformally influenced by the surrounding water and the warm Gulf Stream. The summers are cool and the winters are mild.

Population: More than half of the country's population of 5.3 million live on the islands, of which only about 100 are inhabited. The population is highly urban (86%) and the density is 121 people per square kilometre.

Language: Danish is the official language. A small minority of the population along the German border speak German.

Ethnic composition: The population is primarily Danish (96%). There is a very small ethnic minority of Germans.

Capital: Copenhagen, which is on the island of Zealand, has about 25% of the nation's population.

ECONOMIC DATA

Consumer Price Index: 1990=100

1992	104.6	1995	110.3
1993	105.9	1996	112.6
1994	108.0	1997	115.1

Exchange Rates: Danish Krona per US $

1992	6.26	1996	5.94
1993	6.77	1997	6.83
1994	6.08	1998 (July)	6.95
1995	5.55		

Time difference: Denmark is 1 hour ahead of Greenwich Mean Time (GMT) and six hours ahead of Eastern Standard Time (EST).

Currency: Krona, which divides into 100 øre.

Business hours:
8:30 am - 6:00 pm, Monday - Friday (varies)

Dialling code:
Inward dialling code for Denmark is 45.

expected to have the greatest commercial building boom while Århus enjoys a better balance between demand and supply.

Practice in Denmark

Economic growth from 1993 onwards created an increase in activity for Danish architects. Currently 550 architectural practices are members of The Danish Council of Practising Architects. Only five practices have more than 100 employees, and none have over 140. A third of all practices are small single-employee enterprises. The collective earning for members was US$258 million (1.78 billion Danish krona) in 1997.

Fifty-five to 57 percent of architecture and design jobs are within the private sector and 43-45 percent are within the public sector. While most jobs undertaken by architecture and design companies are subject to normal market conditions, 15-16 percent of these jobs are subject to the EU's Council Directive relating to the coordination of procedures for the award of public service contracts, which states that state financed buildings costing more than US$5.4 million (3.75 million Danish krona) must be tendered in all EU countries. The impact of the Council Directive was particularly negative when Guthenberghus in Copenhagen was rebuilt as the Danish Film House. Clearly, the best proposal was a project by Henning Larsens Tegnestue. However, the architects Nielsen, Nielsen and Nielsen (3 x Nielsen) won the competition, because Larsen's proposal did not adhere to the guidelines of the directive, and was dismissed for "formal reasons".

The Federation of Danish Architects is nevertheless of the opinion that the Council Directive has had a positive effect on the quality of proposals. Two hundred and twenty-five Danish practices have "pre-qualified" under the rules of the statute for the right to compete for public projects, and fears that only the large and well-known practices would be involved seem to have been averted. Foreign companies are increasingly involved in these competitions as well. The Norwegian architect Sverre Fehn won the competition to build the extension to The Royal Theatre ›

Above:
Faaborg Kraftvarmevaerk, heat and power plant by Lundgaard & Tranberg Architects, Faaborg

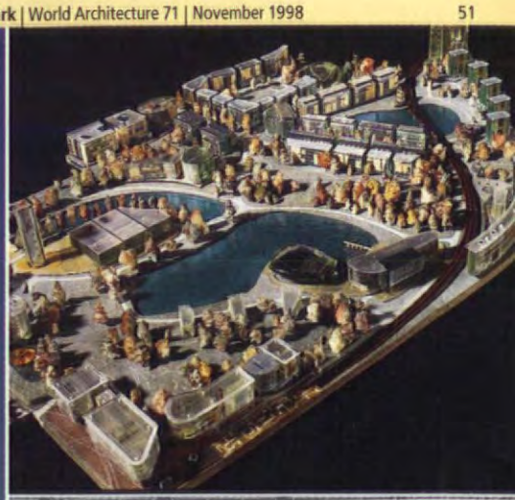
in Copenhagen, although the project was eventually blocked because of the location in an "architecturally sensitive area".

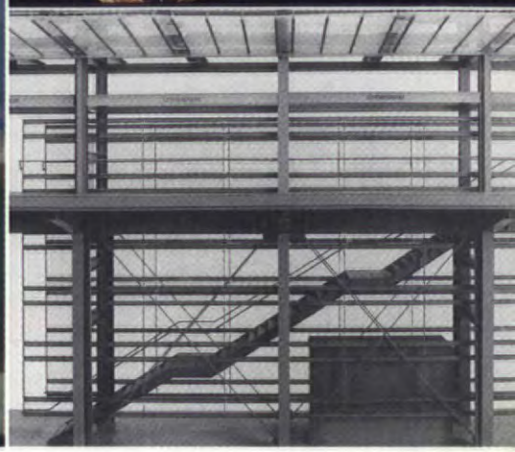
Ørestaden – a model for regional growth

Foreign architects featured heavily in the competition for Ørestaden, a new urban development covering 300 hectares on the island of Amager, south-west of the centre of Copenhagen. Two out of four first prizes were awarded to foreign companies Matthew Priestman/Tower 151 Architects of the UK and Artto, Palo, Rossi, Tikka and Kaijansinkko of Finland. During early summer of 1995 the Finnish proposal was chosen as the basis for further development. Although a good deal of the proposal was never realised, a boulevard, a canal winding its way from north to south and a new metro, currently under construction at a cost of US$912 million (6.3 billion Danish krona), have come to fruition. The 21-kilometre metro will have three lines travelling from the centre of Copenhagen; one will go to Ørestaden, another to Copenhagen Airport. The stations, many of which are above ground, have been designed by KHR AS Arkitekter. The metro is to be financed by sales of real estate around Copenhagen harbour and in Ørestaden itself.

In order to stimulate the development of the area the Danish state has set the ball rolling by holding two competitions to develop adjacent areas; one for a new National Archive and another for The University of Copenhagen, Amager. The two projects will be situated in the outskirts of Ørestaden in the University Township. The 620,000-square-metre site is also to house the Music Conservatory, Royal Danish Library departments, housing and offices.

The competition for the 60,000-square-metre National Archive was won by the German architects Behnisch, Behnisch & Partner ahead of the Danish architects Lundgaard & Tranberg in collaboration with Matthew Priestmann, UK. The tender was invited as a project competition with a limited number of participants as prescribed in the EU's Council Directive. Four participants had been chosen beforehand, six were chosen via pre-qualification which was announced in the EU Times; half of the participants were foreign architects. US$3.6 (25 million Danish krona) has been granted for the planning phase and construction is anticipated to start in 2000.





Facing page: Dissing + Weitling's Book Storage facility for the Royal Library at Copenhagen University, Amager

Clockwise from above left: Conceptual model of the National and Provincial Archives, Copenhagen by Behnisch, Behnisch and Partner; Work by Tower 151 Architects on the New University of Copenhagen, Amager in the northern sector of Ørestad; model of PLM Architekter's overground stations for the new Copenhagen Metro

The competition for extending The University of Copenhagen, Amager was won by the Danish company KHR AS Arkitekter, which will build an entirely new university. This extensive 100,000-square-metre project is expected to be completed by the year 2007 at a cost of US$246 million (1,7 billion Danish krona).

When completed, the Ørestaden development will house 22,000 students, 50,000 employees and 25,000 inhabitants.

Tenders, organisation and financing

The development of Ørestaden has been put in the hands of Ørestadsselskabet, which was established in 1993 as a partnership and therefore not subject to the Open Files Act – a Danish law which guarantees public access to all files on State projects. Forty-five percent of the company is owned by the State and 55 percent is owned by the Copenhagen Municipality. Consequently Ørestadsselskabet has been able to make use of a particular form of calling for tender, whereby the submitted tenders do not have to be made public. This way of organising large construction projects arose as a method of coping with the huge investments in infrastructure and has become quite common.

Other large building projects have been initiated by the State as part of its Culture Plan Year 2000 conceived in 1986 by the Ministry of Culture. The purpose was to strengthen the big cultural institutions after a long period of government support for the smaller institutions in the 1970s. An extension was planned for The Danish National Gallery and the winning project in the open competition was designed by C F Møllers Tegnestue. The extension in glass and concrete is attached to the old 1889 building by Vilhelm Dahlerup and cost US$34.6 million (239 million Danish krona).

Private financing of public utility building also occurs. The Musikhuset in Esbjerg designed by Jørn Utzon in collaboration with his eldest son Jan is an example of this. The structure has mushroom-shaped columns inspired by trees in the nearby park. The concert hall came in at US$14,5 million (100 million Danish krona).

Other projects are put in the hands of private contractors and their architects. The development of Copenhagen harbour is a prime example of this, and the result is a row of rather ordinary corporate and residential buildings, erected with disregard for any overall plan for the harbour area. The architects Kieler Architects, Niels Brøns and PLH Arkitekter have achieved great financial success from working for large developers, but their harbour projects have been subject to strong criticism in the press by architect colleagues.

Despite financial success, private contractor development of Copenhagen harbour has produced "rather ordinary buildings"

There are, however, several acclaimed buildings in the area, for example the extension of the Royal Library, called the Black Diamond, situated at Christians Brygge on the harbourfront. The architectural design by Schmidt, Hammer & Lassen is ›

Top left: Interior of the extension to the Danish National Gallery by CF Møllers Tegnestue
Below left: Exterior of the extension showing glazed foyer space
Above right: Extension to the Royal Library Copenhagen by Schmitt, Hammer & Lassen

Facing page, clockwise from top left: The Misikhuset Esbjerg by Jørn and Jan Utzon, Esbjerg; Dissing + Weitling's extension to the Royal Vetinary and Agricultural University, Fredericksborg; interior of Royal Vetinary and Agricultural college, Copenhagen, by Dissing + Weitling

› viewed very positively and is expected to be completed by the end of 1998. The Copenhagen based companies Henning Larsens Tegnestue, Vilhelm Lauritzen, Vandkunsten, Dissing + Weitling and KHR AS Arkitekter, and the Århus based companies Cubo Arkitekter and 3 x Nielsen have also built highly recognised buildings in the harbour.

Building bridges

Another landmark development is the Great Belt Link, connecting Zealand and Funen. It is now possible to drive by car from Copenhagen to London. "The bridge is a symbol of national unity, but is also an international symbol of Danish ingenuity and competence," said the chairman of the board for A/S Great Belt Contractors Poul Andreassen at the opening of the Great Belt Bridge in June 1998. The bridge was designed by Dissing + Weitling, the practice founded by Arne Jacobsen.

The other new bridge is the Øresund Fixed Link, is designed by the Danish architect Georg Rotne. It will be complete in the summer of 2000 and will connect Denmark and the southern Swedish region of Scania, which was Danish for 700 years. Scania's inhabitants are currently experiencing a growing awareness of their regional identity and Danish heritage. Amid local fears that the area surrounding Copenhagen would be sidelined by European visions of growth in the established metropolis, the link over the sound and Ørestaden were projected to establish the whole region as a growth area. The Danish Government views the Øresund region as a model of how to create economic growth by regional thinking instead of national thinking. The Øresund region will have a population of three million when the bridge is finished; US$5.1 billion (35 billion Danish krona) is being invested in infrastructure and the government expects between 40,000 and 50.000 new jobs to be created in the region.

At the heart of the connection between Sweden and Denmark will be a subway station terminal at Copenhagen Airport. Transportation time to Copenhagen city centre will be 10 minutes, to Malmö city centre will be 23 minutes. General contractor on the development of the subway station is A/S Øresundsforbindelsen, the station terminal's general contractor is Københavns Lufthavne A/S. Both projects opened during the autumn of this year and were designed by Vilhelm Lauritzen, who also designed the acclaimed original terminal building. Copenhagen Airport is one of the busiest airports in Europe and has been extended several times. Today there are approximately 17 million passengers per year; in 2005 the airport will be able to service 25 million. Henning Larsens Tegnestue is currently working on a new terminal. All these developments intended to focus on Copenhagen as a growth area.

Cultural capital

Copenhagen was also the centre of attention when it served as Cultural Capital of Europe during 1996. The state, municipalities, private foundations and investors managed to initiate a veritable construction boom, the like of which has not been

seen since the end of last century. In all 45 buildings went up directly or indirectly in connection with the Cultural Capital year. Major new buildings were opened and squares, buildings and landscapes were restored and renovated.

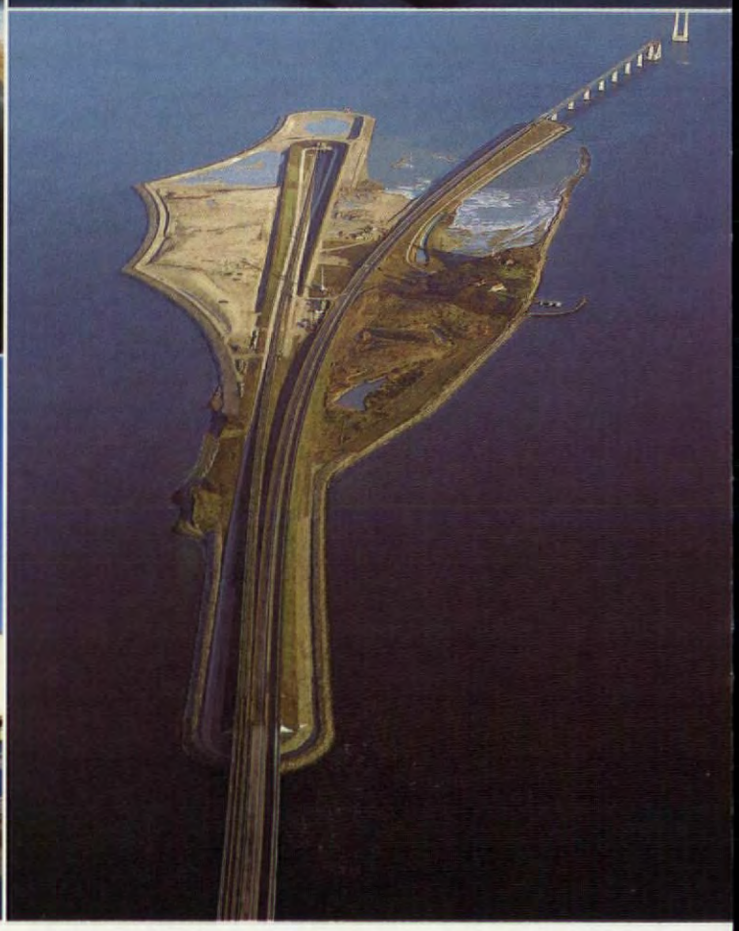
Of these major projects opened in 1996, Arken Museum of Modern Art was perhaps the most controversial and interesting. It was developed in order to put the region south of Copenhagen on the cultural map of the area. The choice of Søren Robent Lund's project – he was a young architecture student – was highly controversial and when the museum opened it was Denmark's first piece of architecture inspired by deconstructivism. It evokes the image of a shipwreck cast upon a the shore amongst dunes and salt marsh.

International attention was also directed at a project which attracted thirteen world famous architects, among them Arata Isozaki, Richard Meier, Alvaro Siza and Dominique Perrault. They have created a permanent Architecture Park of small allotment gardens on a site in Vallensbæk. Attention was again focused on Copenhagen when the Danish Academy of Architecture along with three other educational institutions was moved to the former military area of Holmen in Copenhagen harbour. The Academy of Architecture moved into restored buildings, while the other institutions moved into new buildings designed by Cubo Arkitekter.

Life outside the capital

One of the greatest recent architectural manifestations, however, is located in the most distant area of Denmark. In Nuuk, the capital of Greenland, The Nordic Cultural Centre Katuaq (the drumstick) was opened to contribute to creating a cultural renaissance for the Inuit population. The Centre is beautifully situated like a sculpture in the arctic landscape. The entrance is formed as a 70-metre-long waving front, lined with Scandinavian larch. Proponents of the project wished to portray Greenland in the present – rather than stressing the past through the use of a more traditional museum; critics would have preferred the money to have been spent on projects for public utility rather than such a prestigious landmark. ›

"The Danish Government views the Øresund region [with the Øresund Fixed Link] as a model of how to create economic growth by regional thinking instead of national thinking."



Clockwise from top left: Interior of Nordic Cultural Centre, Nuuk, Greenland by Schmidt Hammer & Lassen; Helsingor Renseanlaeg by Boje Lundgaard and Lene Tranberg; Sprogo, an artificial island designed as part of the Great Belt Link by Dissing + Weitling; exterior of Nordic Cultural Centre, Nuuk, Greenland by Schmidt Hammer and Lassen

› The centre was designed by Schmidt, Hammer & Lassen, which is also designing the new Museum of Art in Århus. Third prize in the open competition for the Århus museum was awarded to Hardware Architects & Designers, London, and internationally renowned architects such as Kisho Kurokawa, Jo Coenen and Hani Rashid participated. The museum is sliced throughout its entire length by a slightly curved glass enclosed museum street. The competition was initiated by Århus Municipality and the 15,000-square-metre museum is projected to cost US$36.2 million (250 million Danish krona). It will open in 2001.

Residential buildings

Danish housing has attracted international attention and recognition. In recent years the construction industry has been experimenting with environmentally friendly design. In the Egebjerggård district in Ballerup 25 experimental buildings, with a total of 900 apartments, are on display. It constitutes a veritable feast of architectural ideas and experiments – new planning methods, building and energy-efficient installations – indicating new directions in home design. Many of Denmark's most prominent architects have contributed to the area, including Vandkunsten and Henning Larsens Tegnestue. Egebjergård represents a break with the Danish planning practices of recent years and is the result of a competition held in 1985. The district consists of a series of dense, low-rise buildings, developed in four stages. The objective was in part to create a residential district focusing on the residents and consumers, while at the same time ensuring variety, by interspersing residential dwellings with shops, schools and local institutions.

CONSTRUCTION FACTFILE provided by Hanscomb

Procurement of construction: Procurement follows the traditional design-tender-build approach practised in most Western countries. The bid package consists of drawings, specifications, general conditions, form of contract and form of tender. Design is typically about 75% complete at tender stage. Following the tender, the architect and engineers complete the design, not the contractor.

Separate trade contracting is the traditional form of contracting for construction services. The use of general or main contracting is growing. Owners may use design-build contracts, but this is not common. Major contractors may have in-house design staffs for design-build work. Unit Price contracts using bills of quantities are not common for building projects in Denmark, instead a fixed price/fixed time contract is used. There is no tradition for arbitration, although an official Arbitration Court is available.

Selective tendering is the most common form of selecting a contractor. Owners sometimes use open tendering, negotiated tendering is unusual. A lump sum stipulated sum contract is the most common form of construction contract for both public and private sector work. Trade associations often publish standard price schedules for their members. Tenders by trade contractors are often based on their own quantities and prices from the standard schedule

There is a standard form of building contract conditions that is widely used, *Almindelige Betingelser for Arbejder og Leverancer* (AB92). There is also a standard form of contract for Design-Build (ABT93).

Design professions: Private practices for architects and engineers tend to be small, apart from a few major companies, who also are working internationally. There are no legal requirements to use an architect. It may be slightly more usual for the architect to hold the engineering contracts, but it is common for the owner to contract for engineering services directly and the architect will manage the design process.

The architect or the consulting engineer is typically responsible for construction site coordination. Owners may choose to use independent project managers to provide on-site assistance in managing and coordinating larger construction projects.

Contractors: Since trade contracting is favoured, there are numerous subcontrators, mostly operating on a regional basis. There are a few large main contractors that operate nationally.

Governing codes and standards: The *Dansk Standardiseringsraad* issues and maintains the Danish Standards. The national Building Regulations (*Bygningsreglement*) are administered by local jurisdictions. They are issued by the Ministry of Housing under the powers of the Building Act (*Byggelov*).

Construction materials and methods

Material availability: Denmark has limited natural resources, so most building materials – apart from cement and bricks – are imported. All common building materials are readily available in Denmark.

Labour availability: A highly skilled labour force exists. It is highly unionised.

Favoured construction techniques: For commercial structures and for residential construction in multiple storeys, a reinforced concrete structural frame with precast elements is typical. The exterior walls are often of insulated precast concrete elements or with an innerwall of concrete and exterior wall made on site with bricks. Interior partitions construction is usually gypsum board on metal studs.

For detached family houses light concrete walls are used as interior walls with bricks as exterior surface. The roof structure would be timber frame with a tile roof. Interior partitions may be light concrete or gypsum board on wood or metal studs.

Industrial buildings use either reinforced concrete or steel for the structural frame. Exterior walls would be precast concrete. Roof structure would be precast concrete with felt roofing.

Construction cost guides

Approximate construction costs: The following square metre unit rates, typical for the Copenhagen area, are provided for rough comparison purposes. The costs exclude land, site work, infrastructure, professional fees, and VAT.

Building type	Krona/m^2
Distribution centres	4,500-5,200
Office building, mid-rise, no AC, shell & core	4,000-4,500
Office building, mid-rise, no AC, tenant fit-out	2,000-2,500
Apartment buildings, 2-3 stories	5,000-5,600
Parking structure (multi-story)	2,900-4,100
Industrial buildings	3,800-4,900

Regional price variations:
Outside the Copenhagen area construction prices are typically 5% less in urban areas and up to 10% less in rural areas.

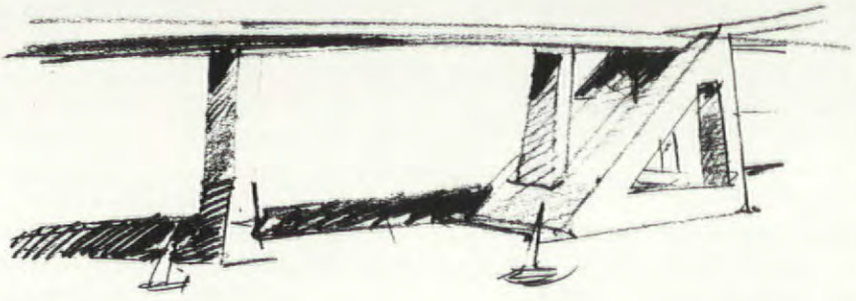
Useful addresses

Danske Arkitekters Landsforbund
(Federation of Danish Architects)
Strandgade 27A,
1401 København K
Phone: +45 33 13 12 90
Fax: +45 33 93 12 03

Danske Entreprenurer
(Danish Contractors Association)
Nørre Voldgade 106
1358 København K
Phone: +45 33 13 88 01
Fax: +45 33 13 24 50

Face to face

Danish design logic



The Øresund Link and the Great Belt Link are the most high profile constructions to have been built in Denmark this century. Poul Ove Jensen, of bridge architects Dissing + Weitling, talks to Katherine MacInnes.

Poul Ove Jensen is bespectacled and hesitant but with an air of assurance that belies his appearance. Not surprisingly, Dissing +Weitling designed his glasses. "Air titanium glasses," he explains, handing them over for inspection. "They are made of titanium. You see how light they are?" Titanium, used by Gehry to clad the Guggenheim in Bilbao, Spain, is a metal that is so tough that it wears down cutting tools and can only be welded in a vacuum – "so we devised a method of making it into a wire and winding it. They are the best selling glasses in the world except for here, in England".

Jensen is one of the directors of Dissing + Weitling, essentially an architecture practice but with varying design capabilities – Dissing + Weitling can design anything from delicate spectacles to reclaimed islands by applying the same Danish design logic.

"We do just about everything," confirms Jensen. "I mean we have a department that does graphic design – the smallest product we've done so far is a postage stamp, we do industrial design, light fittings, hospital equipment, but our most successful product commercially speaking is these glasses.

"We have not been involved in the old bridges," he explains, "but Denmark is a country comprised of a collection of islands, we need bridges. We were invited to submit a proposal by the government-owned limited Great Belt Link company, because we are one of the main practices in the country.

"We designed the Øresund Link island in co-operation with hydrologists, biologists, environmentalists and so on. The problem is the 'blocking' effect of the island – we had to make it literally streamlined. It is made of dredged seabed which compensates for the blocking effect of the piers and the towers.

"We knew that the island would be seen from above from all the people in aircraft arriving at, or leaving from, Denmark's main airport. We wanted to give it a pleasing shape. We tried to preserve the original island as much as possible. The artificial part increases its size tenfold.

"The traditional role of the architect in bridges has been to design the details when the concept had been designed by the engineers. In some cases architects ruin bridges by embellishing them unnecessarily. Architecturally there isn't much you can do to a suspension bridge. With other types of bridges you can have a lot of variation but you can't change the curve of the suspension cables which is the most characteristic thing about a suspension bridge. You can work with the proportions and with the shape of the individual elements: anchor blocks, piers, pylons etc – but the principle is ancient.

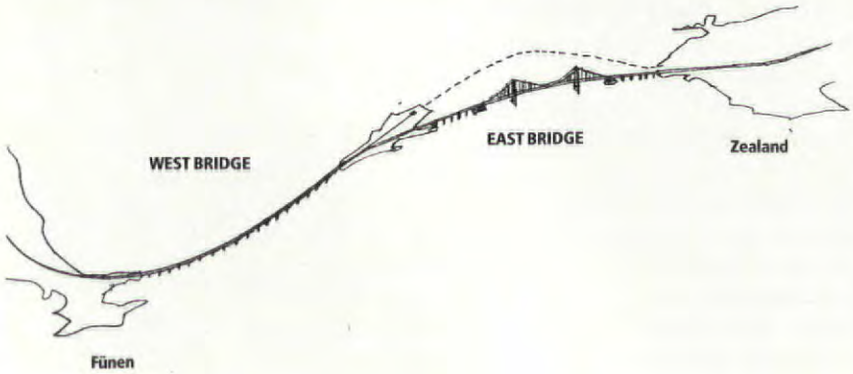
"Bridges play an enormous role in our history. The bridge was one of the first major constructions in any big city. Wars have been fought over them."

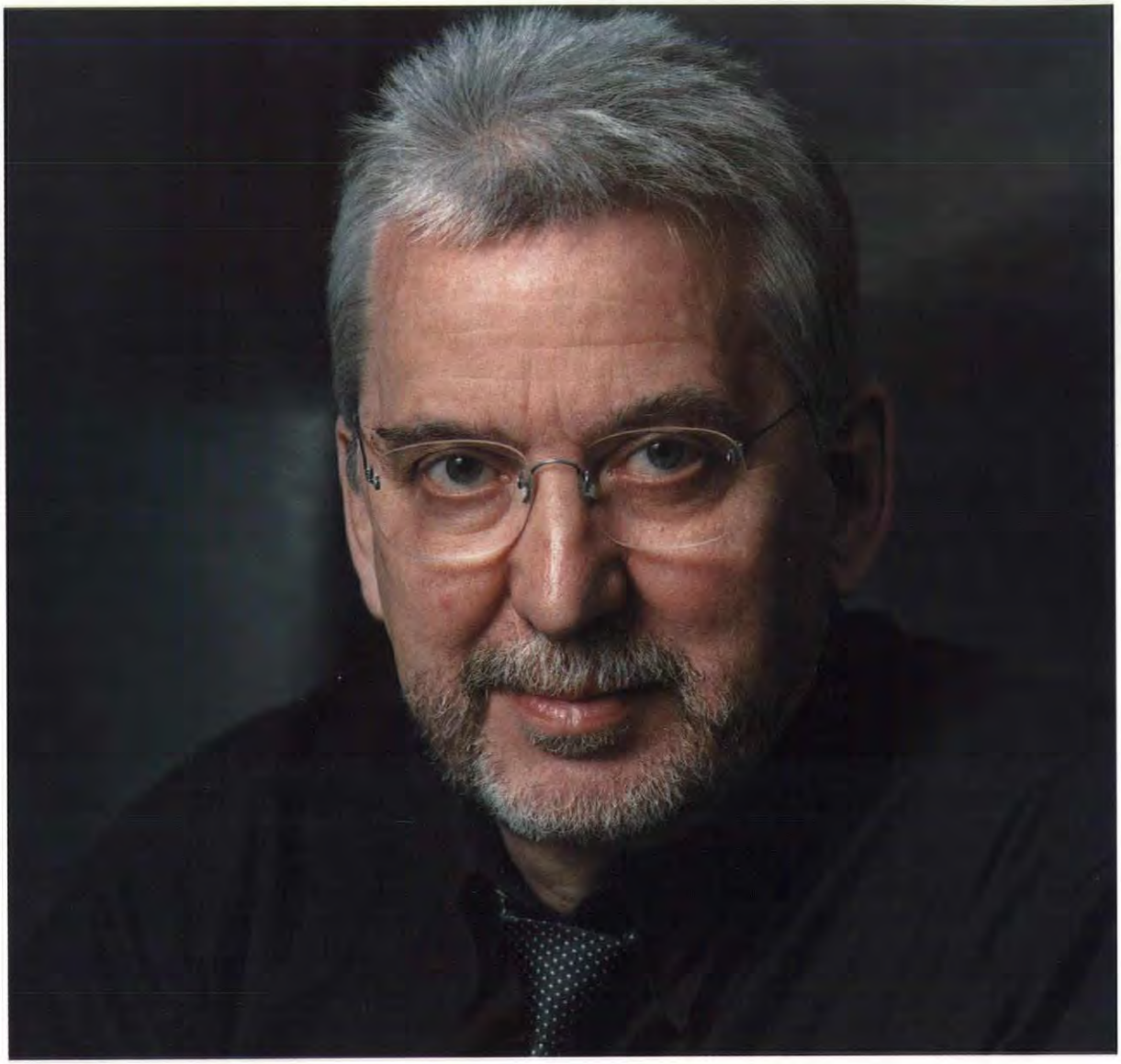
Jensen explains that although architectural involvement in bridge design is unusual he believes that it is important. "There was an intense debate for years mostly against the Great Belt Link bridge. People were concerned about bankruptcy of the nation, or concerned for the environment, but nobody ever discussed the fact that we were going to put this very big structure into Denmark's flat and gentle seascape. Somehow people don't look at bridges as architecture.

"The western bridge is not our design. It is a very heavy and, in my view, rather clumsy beam bridge. But it was not necessary to

Above left: Anchor block bridge girder

Below: Great Belt link – Denmark





"We do just about everything... industrial design, hospital equipment, but our most successful product commercially speaking is these titanium glasses."

have a suspension bridge on this side because it isn't a major shipping route. The eastern bridge, however, had to be suspension with a 60-metre clearance height for shipping."

The eastern suspension bridge, designed by Dissing + Weitling, is indeed an elegant construction. "The girder for the Great Belt Link is streamlined to reduce wind resistance. We tried to avoid windscreens because they obscure the view." The bridge runs east-west and the prevailing wind is from the west.

"Steel panels were produced in Italy, shipped to Portugal and welded into boxes, then shipped to Denmark – the cheapest solution."

Dissing + Weitling has subsequently designed bridges in the US, Taiwan, the Philippines and Germany. In retrospect, Jensen concludes that "when you are talking about large bridges, the price is very often the deciding factor". But their failure to win the western bridge taught them that "you are wasting your time unless you design the cheapest possible solution. It was a political decision".

Predictably, the suppliers for the eastern suspension bridge were equally international: "But the concrete came from Denmark. The piers were prefabricated but the pylons are 200 metres tall so they had to be poured on site. The steel panels were produced in Italy. They were shipped to Portugal where they were welded into boxes and then they were shipped to a Danish town 300 kilometres from the site where they were put together and then they were shipped to the site. This was the cheapest solution." Jensen does not think that this is exceptional – "all the steel parts for the Kansai airport in Japan were made in England for example.

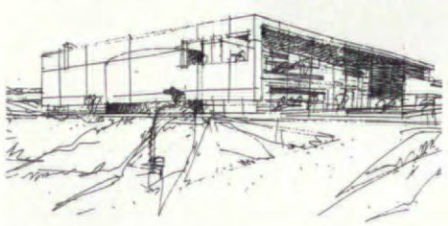
"At Øresund we worked with a consortium including Halcrow & Partners in England, Tunnel Engineering Consultants of Holland and Walther Mory Maier of Switzerland, as well as Ramobøll A/S of Denmark and Scandia Consult, of Sweden."

The team set up an office in Ramobøll's office in Copenhagen. "Mostly we spoke English. It was the working language. All written material was in English. That is normal with international bridge projects. Apart from the tunnel team, which was almost all Dutch, all the other teams were mixed. And that was one of the fantastic things. After a while people forgot where they belonged. I think that is one of the greatest things about working with bridges. The team work is very exciting."

New buildings in Denmark

Illusion and reality by the North Sea

The North Sea coast of Denmark is rough, harsh and shaped by the prevailing westerly winds. In this landscape The North Sea Centre was built in 1984 in the small town of Hirtshals, as a research institute for the fishing trade and a museum dedicated to the North Sea. The centre's main attractions at that time included a large saltwater aquarium, designed by the Danish architects Friis & Molkte. The vast complex was designed over a grid system, enabling flexible growth by means of simple cubic units in red brick. The Nielsen, Nielsen & Nielsen-designed Oceanarium of 1998 is a substantial extension of the leisure aspect of the centre, focusing on the vastness of the ocean. The huge saltwater aquarium, the biggest of its kind in the world with 4.5 million litres of sea water, is now the main attraction at the centre. Olaf Lind reports from the North Sea.



Perspective toward entrance

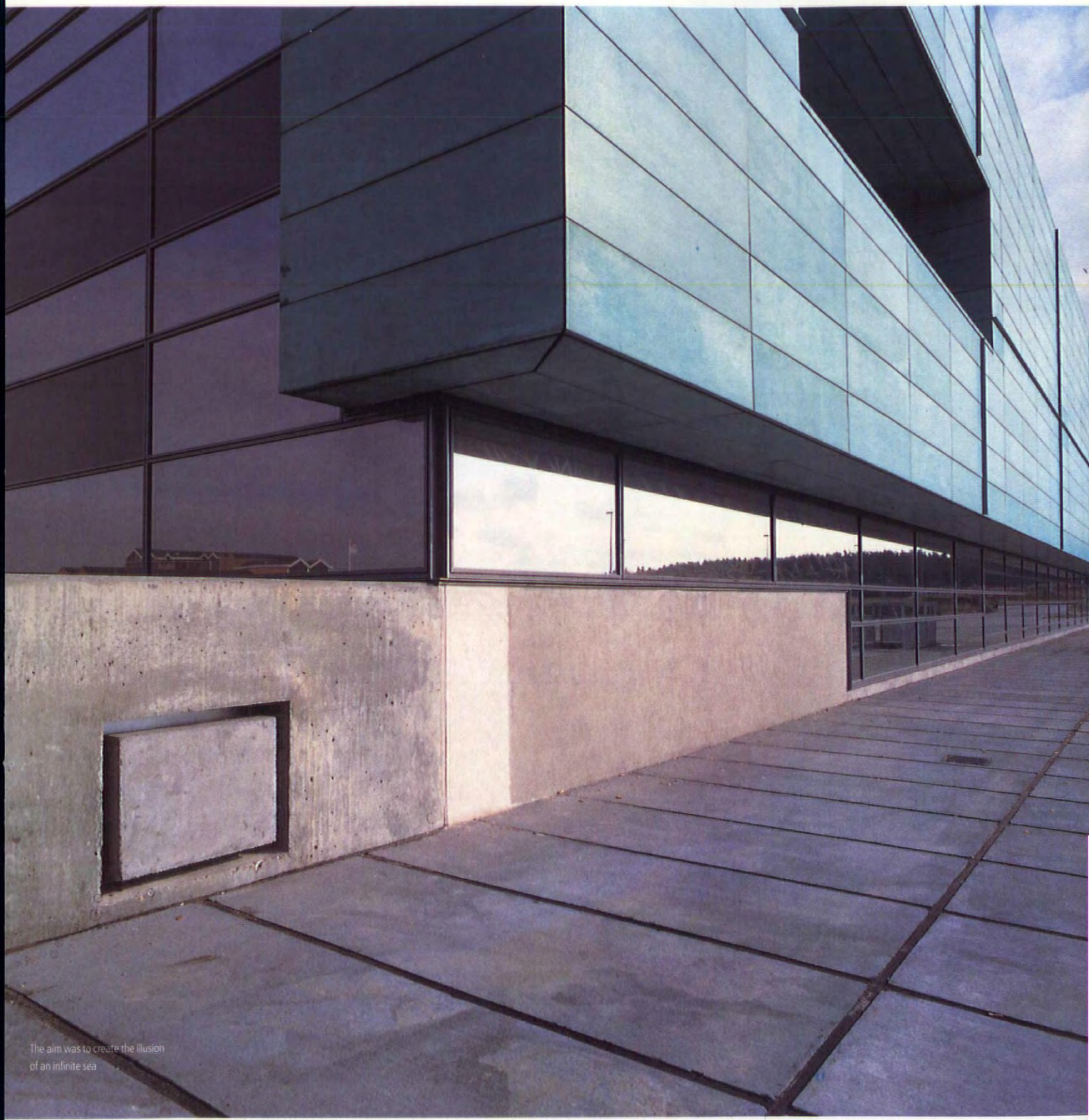
The view through the windows of the aquarium – which are as big as cinema screens – is enthralling: vast numbers all the indigenous species of North S fish turn slowly anticlockwise around the periphe the gigantic column of water

The exterior is comprised of green copper, glass and metal

The architects

A closed competition to design The Oceanarium between five Danish firms was held in1996 and won by Nielsen, Nielsen & Nielsen (3 x Nielsen). The architectural challenge was not only to shape suitable surroundings for an unusual marine exhibition, but also to connect the extension properly to the old centre's architecture, which is typical of its period and of the well documented style of Friis & Molkte.

3 x Nielsen has succeeded with its spectacular oval-shaped aquarium. Equally convincing is the meeting between the older buildings in deep red brick and the new one with its concise forms in green copper, glass and metal, since both styles have a similar formal simplicity. The Oceanarium's roof edge and its facade to the north-east – all covered with pre-patented green copper – form a forceful angle, hovering over the concrete plinth, which follows the long, glass facade to the north-west.

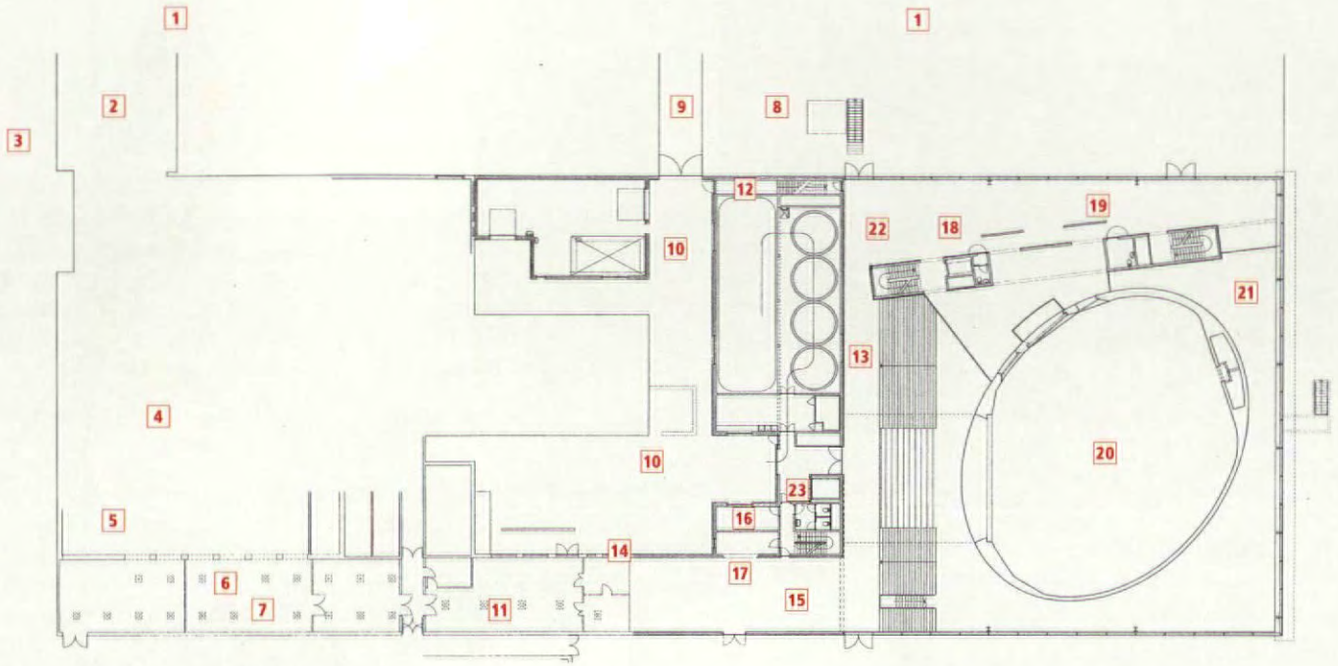


The aim was to create the illusion of an infinite sea

But the new addition also demonstrates a conflict between two theories of exhibiting. The basic concept of the winning project by 3 x Nielsen was that the aquarium would be a free-standing "sculpture" presenting a huge, column-like section of the North Sea. According to Lars Frank Nielsen the aim was to create the illusion of an infinite sea seen through the carefully placed windows in one side of the aquarium – an artistic combination of form and illusion.

The client

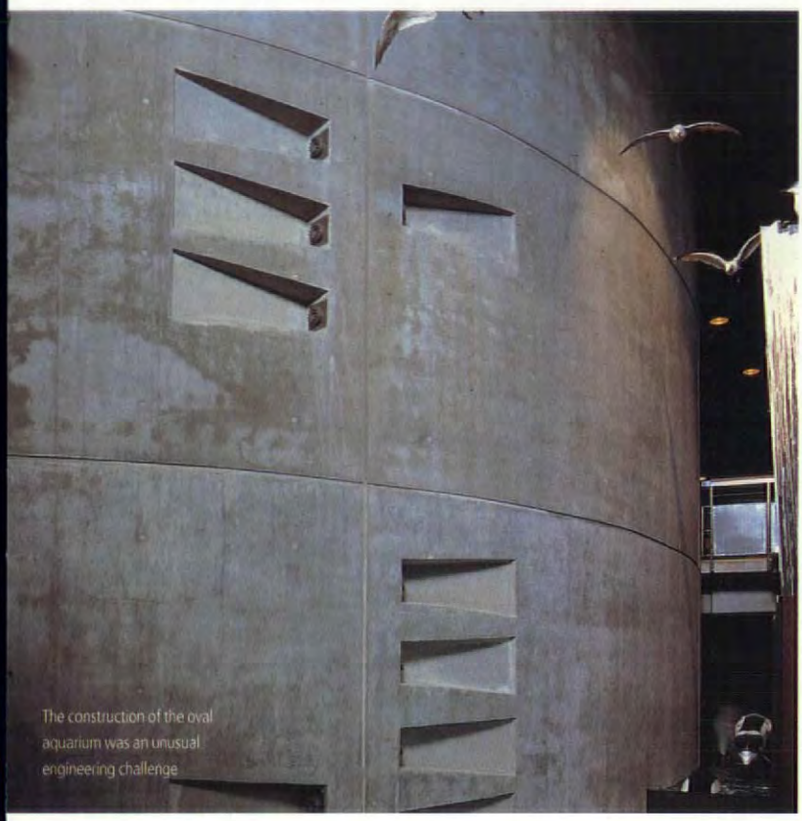
Susanne Fibiger, the manager of the North Sea Museum, was opposed to this concept and advocated a one dimensional approach in order achieve the required illusion of an endless expanse of water. The freestanding aquarium obviously conflicts with this concept; walking around it you loose the illusion of its horizontal infinity. The manager compares this architectural concept with a blown-up home aquarium and would have ›



Key to ground floor

1. Promenade
2. Shop
3. Entrance
4. Aquarium
5. Existing exhibition
6. Meeting point
7. Roof light
8. Basin
9. Bridge
10. Equipment storage
11. Wet laboratory
12. Testing room
13. Amphitheatre
14. Light cabinet
15. Depot
16. Fish kitchen
17. Wall of fish tank
18. Elevator
19. Kitchen
20. Tank
21. Exhibition
22. Toilet for handicapped
23. Good lift

The roadside facade of the new aquarium

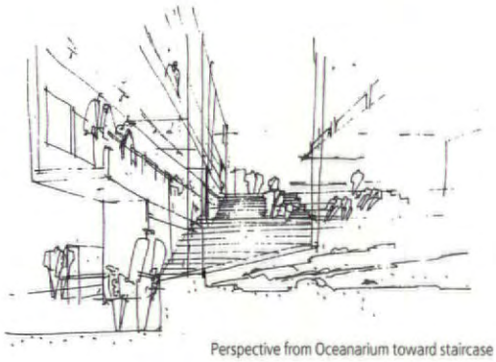


The construction of the oval aquarium was an unusual engineering challenge

The restaurant area is glazed along one side for maximum natural light and views out over the sea

› preferred a more diorama-like solution as seen in many natural history museums.

Because of this conflict, the Oceanarium is a compromise. The strict intentions in the architecture collide with an overwhelming variety of visual and auditory illusions and other entertaining features. However interesting from a philosophical point of view, the debate about the design does not seem to affect the public. Before the opening of the Oceanarium in May 1998, The North Sea Museum had 250,000 visitors annually – making it the most popular museum in Denmark. During the few months since the opening, the number of visitors per month has doubled.

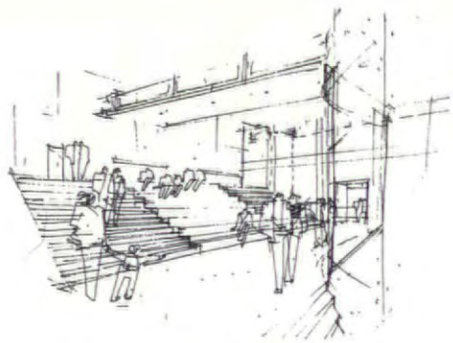


Perspective from Oceanarium toward staircase

The engineer

The construction of the oval aquarium and its huge windows has been an unusual challenge to the engineers Viggo Folmer. Peter Rasmussen of that firm reports that the concrete wall of the aquarium, reinforced with pre-stressed steel wires, presented a major problem because of the oval cross-section. In order to foresee and prevent corrosion in the wires, they are equipped with thin coats of titanium, which give protection. The huge acrylic windows are a Japanese product glued together in sections by a special team of Japanese workers. The joints between the 40-centimetre-thick sections are hardly visible. In order to install the windows assistance was required from specialists at the University of Aalborg, who made the complicated optical calculations.

The aquarium stands on the ground about one storey below the surface of the terrain. This was another major problem for the engineers since the weight of 4.5 million litres of water in the aquarium plus that of the concrete walls puts a substantial pressure on the groundwater, which reacts with a ›

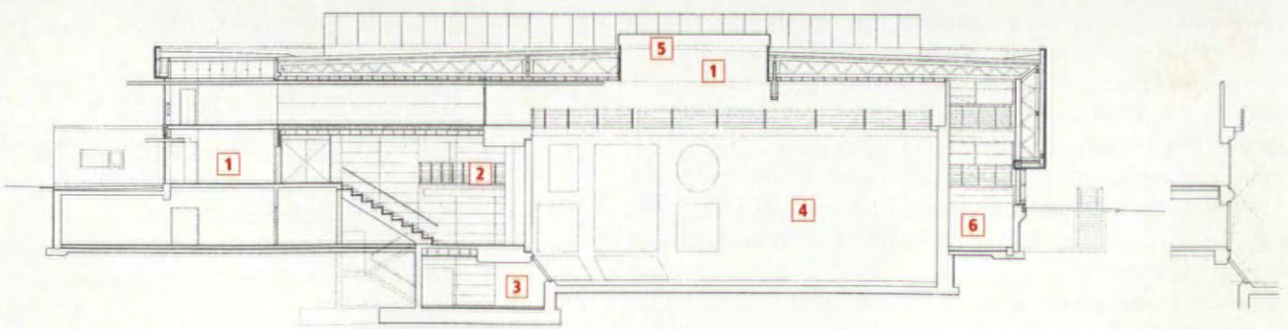


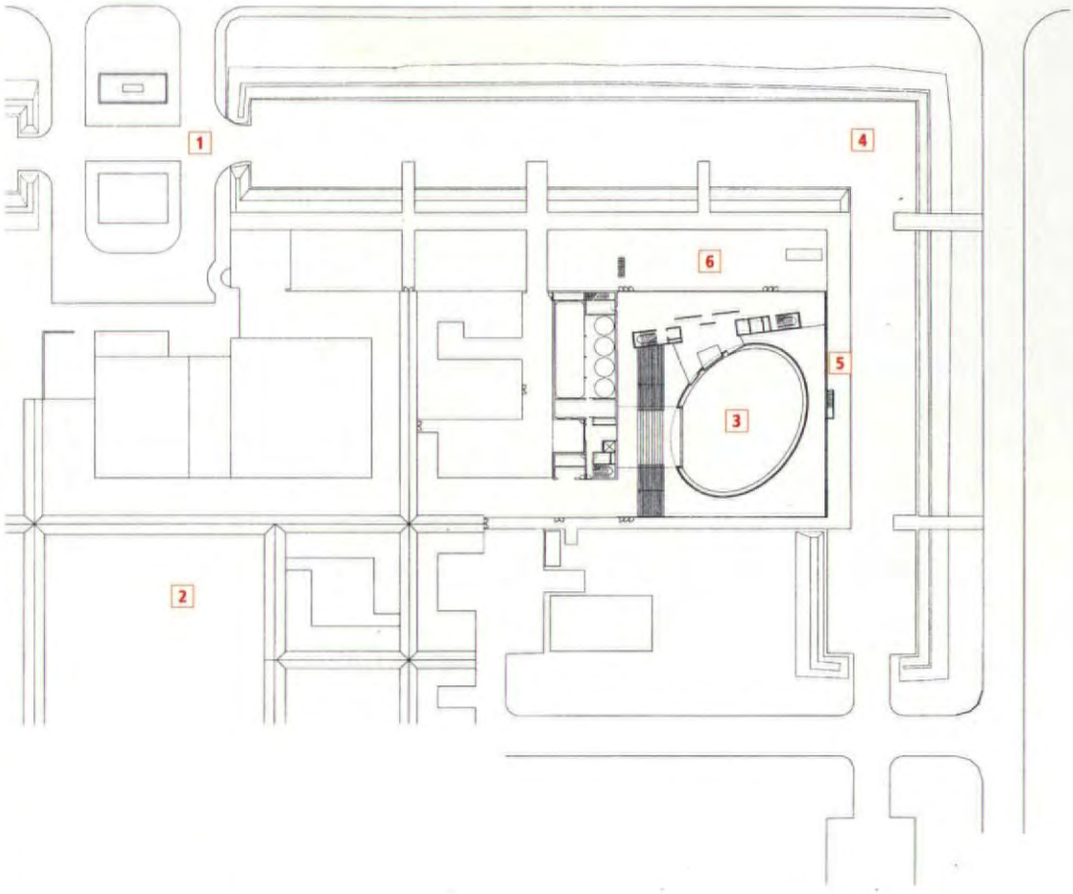
Perspective at the corner of amphitheatre

The acrylic panel windows

Key to section

1. Technical zone
2. Arena
3. Sea bottom room
4. Tank
5. Skylight
6. Exhibition space





Key to North Sea Centre plan

1. Entrance
2. Seal basin
3. Oceanarium
4. Parking
5. Promenade
6. Exhibition space

corresponding lifting force. Consequently the terrain had to be drained thoroughly.

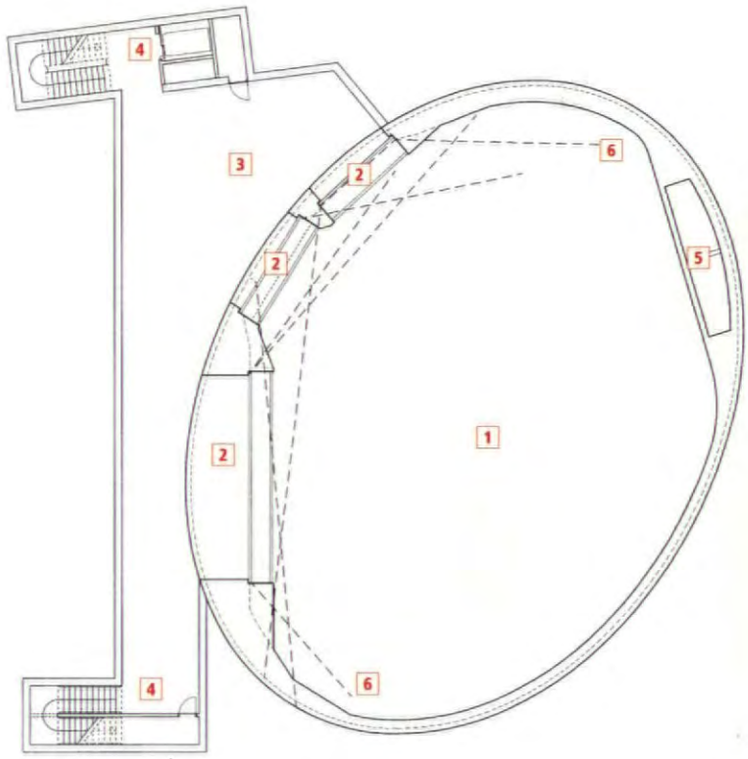
The total weight of the aquarium includes that of the roof since some of the steel lattice beams rest on the walls of the tank. In order to prevent this causing vibrations in the walls, which may disturb the fish, soft bearings have been placed between the beams and the walls. To obtain the blue-greenish colour and waterproofing, the inside of the concrete walls have been coated with a multi-layer, non-toxic epoxy paint.The water in the aquarium is constantly supplied with fresh seawater, from which a recycling system produces heat for the building.

Appraisal

Seen from outside the North Sea Centre and its new extension is a dramatic meeting of two very different types of architecture: the formal structure of the framework in heavy red bricks from the early 1980s to the light touch of a building in glass and copper more typical of the 1990s.

The interior is overwhelming; from the main entrance the visitor is gently introduced to the Oceanarium through a gallery with information screens and experimental instruments. The climax is the tank with its stunning presentation of shoals of ordinary North Sea fish through windows the size of cinema screens, although the impressively clinical architecture of the building is somewhat lost in the dim lighting required to fully show off the main exhibit. The characteristic language of 3 x Nielsen's architecture is apparent throughout, and ultimately satisfying. WA

Client **Municipality of Hirstals**
Architect **Nielsen, Nielsen & Nielsen**
Structural engineers **Viggo Falmer AS**
Contractor **NCC Rasmussen & Scholtz**



Key to aquarium level 0

1. Tank
2. Acrylic window panels
3. "Sea bottom" observation space
4. Access to viewing space
5. Tank overflow
6. Angles of viewing from observation points

Architect
Schmidt Hammer & Lassen
Reviewed by
Olaf Lind

Scandinavian expressionism

Danadata headquarters, Århus

Numerous recently-built administrative buildings form the northern border of the city of Århus, Denmark. Among them the headquarters of Danadata, completed in 1997, is one of the most spectacular. To complement the concave facade of a neighbouring older building, architects Schmidt Hammer & Lassen have created a long, convex glass facade which is partly transparent and partly mirrors sky and clouds.

This architecture plays with dramatic and surprising collisions between forms, materials and colours. The play creates an atmosphere very different from that associated with the classical approach typical of Danish architecture. The exterior and the interior signals of the Danadata building are not only contemporary, they also have an element of futurism. This element corresponds with the digital world creating a dialogue between form and function.

The artist Malene Landgreen, who designed the foyer, used the term "spacey" to describe the Danadata building, referring to its evoking a futuristic construction in outer space. This is an architecture based on movement rejecting stacatto classical solutions to create a dynamic contrast between shapes, textures and spaces.

The 150-metre-long, three-storey-high facade to the north is the backbone of the complex and its most characteristic feature. Instead of dividing the length of the circular segment in half the one-storey cylindrical building, boarded with cedar wood, is placed asymmetrically to it. The contrast between the huge, curved glass facade and the smaller, cylindrical wooden one is strong and precise – kept in balance by careful attention to detailing and proportions. The larger building contains offices and smaller educational rooms. The smaller cylindrical building houses a partly subterranean auditorium with adjoining meeting rooms.

A third part of the complex which faces south has a completely different design. It consists of rectangular boxes boarded with black plates faced in sine-wave aluminium. The

Facing page:
One storey cylindrical customer centre building boarded with cedar wood is placed asymmetrically to the circular segment

Left:
Storage rooms and warehouses are housed in linked rectangular boxes in contrast to the curvilinear form of the main offices

Top:
Geometrical end profiles provide a contrasting finish to the circular segment

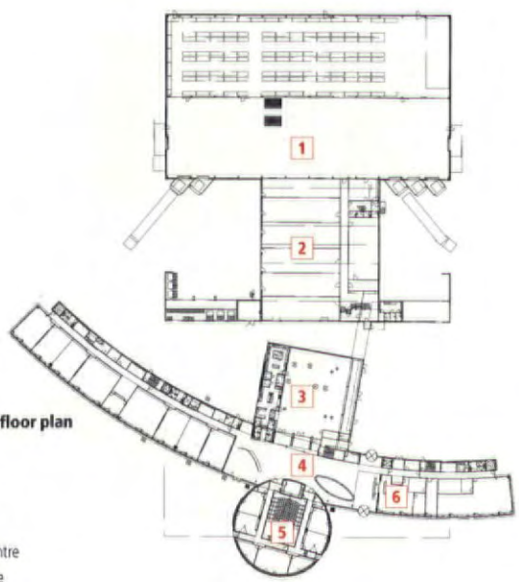
Above:
The double height spaces of the main foyer

company's vast storage rooms and workshops are located in this section.

Between the black boxes and the curved main building is the canteen, a square block slightly pressed into the latter like the auditorium-cylinder. Between these two geometrical forms is the lofty foyer, two storeys high with a footbridge connecting the two ends of the long building.

Unlike a good deal of contemporary Danish architecture, which is focused on its classical and modernistic heritage, the buildings designed by Schmidt, Hammer & Lassen have an expressionistic attitude inspired by nature or manmade objects outside architecture. Examples are their ferry terminal for Colorline (1995), which has the form of a ship, and "Ketuaq", Greenland's Cultural Centre in Nuuk (1997), where the wooden walls curve like aurora borealis. The Danadata headquarters, with its constant reference to futuristic computer design, does not buck this trend. From a distance the building looks like a giant computer screen – Danadata's business is IT sales and education. WA

Client
Danadata
Construction engineer
Ramboell
Landsape architect
Schmidt Hammer & Lassen
Interiors
Schmidt Hammer & Lassen
Main contractor
J&B Enterprise A/S



Key to ground floor plan
1. Storage
2. Completion
3. Canteen
4. Foyer
5. Customer centre
6. Service centre

Architect
Henning Larsen Tegnestue
Reviewed by
Martin Keiding

Glass box

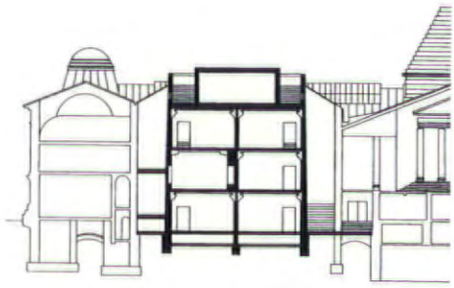
Extension to the Carlsberg Glyptotek

Left:
The glass box creates a covered courtyard – a protected public space

Facing page, above left:
Section showing glass box insert divided into three floors

Facing page, from top right:
Various views of the interior exhibition spaces showing different lighting techniques for different exhibitions and floor lighting for the circulation spaces

Client consultancy
The Ministry of Education's Building Directorate
Structural engineers
Carl Bro Byg A/S
Installation engineers
Cronc & Koch A/S



The Carlsberg Glyptotek and the art collection which the museum housed were presented to the Danish nation as a gift by the influential patron of arts, brewer Carl Jacobsen, whose father and grandfather established and developed the Carlsberg brewery.

In 1897 the first section of the Glyptotek was built, designed by Vilhelm Dahlerup. The second section, by Hack Kampmann, was completed in 1906. Whilst Dahlerup's architecture was historical, the starting point for Kampmann's expansion was an interest in the architectural forms of classicism, which became extremely fashionable at the turn of the century.

In 1992 the museum authorities decided to expand the existing building with a view to improving the relation between the Egyptian collection and the collection of French art. A closed competition was held to design a new building in Kampmann's original courtyard.

The expansion is considered to be a highly successful solution. Kampmann's building is listed, and Henning Larsen's design was chosen as the most sensitive proposal for what is a highly delicate structure, both physically and aesthetically.

His design comprises a glass case with slightly sloping outer walls, which was lowered into the courtyard. In the space between these walls and the facades of the courtyard, a flight of stairs with low risers is suspended, creating a lobby bathed in daylight which streams through an oblique glass roof. From the top level of this staircase, another set of steps provides further access to the roof-terrace at the top of the pyramid. From here there is a wonderful view over the roof of the original museum buildings, the Tivoli fun-fair and, slightly further into the distance, Copenhagen's town hall.

Access to the inside of the glass case is from the landings on the flights of stairs. Inside the case there are artificially lit exhibition spaces with climate control and advanced security systems. Whilst the outside of the case is executed in a milky-white glossy marble-stucco material, a much livelier palette unfolds on the walls in the exhibition rooms, where one finds deep reds, warm yellows and heavy greens.

The surroundings of the paintings and sculptures are reminiscent of, and very likely influenced by, the exhibition environments created in two of Danish architecture's absolute materpieces: MG Bindebøls Thorvaldsen's museum and Carl Petersen's Faaborg museum. The lobby does not provide access to the Egyptian rooms or the mummy hall on the first floor of the glass box, instead one enters the existing complex of buildings via a long, descending staircase. Even though access to the building is unclear, the planning and layout is excellent. It covers 2,500 square metres and is generally considered to be one of the most interesting and original works of architecture built in Denmark within the last ten years. WA

Architect
Hou and Partners
Reviewed by
Martin Keiding

Subtle theming

Roskilde Harbour Centre

In the early 1960s archaeologists discovered five Viking ships at the bottom of a fjord in Roskilde. They were exhibited in a hall designed by Erik Christian Sørensen, completed in 1969. Situated at the edge of the fjord, the original museum is an outstanding building: an elegantly proportioned concrete construction, well planned and with a magnificent view over the water.

During the 1970s and 1980s there was a rise in public interest in the history of the Vikings and the museum found itself short of space. As a result, in 1992 the municipality decided to expand the site with a youth hostel, a restaurant, an extension to the old museum, and the Roskilde Harbour Centre. The design of the Harbour Centre project is the result of a closed competition, won by Hou and Partners, and it is the first building of the wider expansion to be completed.

Situated between the town's harbour and the old Viking ship museum, Roskilde Harbour Centre is a complex of wooden buildings with mono pitch roofs. It sits on an artificial island formed by excavating two canals and an inner harbour, and is connected to the surrounding shore by three wooden bridges. The Centre is a working museum, comprising a boatyard, an education centre, a training centre, an archaeological workshop and an open boathouse. Visitors can experience the building of a Viking ship, and then go on a sailing trip into the fjord on one of the replicas moored by the quay in the harbour.

The new development compliments the original museum, even though Hou and Partners have opted for a markedly different aesthetic. One is left in no doubt that the architects wanted to show respect for the older, recognised building. The houses on the island are built of wood; between the main lime wood gallows, pre-fabricated facade elements are mounted, with cedar wood on the outside and birch veneer panels on the inside. The roofs are felt-clad.

The buildings' organic surfaces, prismatic forms and harmonious positions in relation to each other evoke the early settlements and the evolution of the Vikings' pioneering maritime age. The execution is precise and thorough and the architects have succeeded in finding the elusive balance between the informal and the over-designed. The theme of entertainment has not been overplayed – and that is a virtue of Danish architecture. WA

Architects
Hou & Partners
Engineer
Carl Bro
Landscape architet
Jeppe Aagaard Anderson
Consultants
Højgaard & Schultz
Photographer
Sofie Helsted

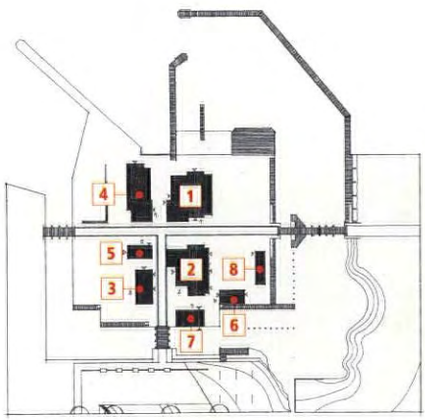
Facing page top:
The wooden slatted exterior facings are characteristic of this region

Facing page below:
Model viking boats in the boat yard depot looking out over the harbour

Above:
Buildings arranged to look like a typical Danish seaside village

Left:
The inner courtyard area is defined by surrounding buildings

Below left:
Layout of the museum buildings



Key to site plan

1. Boatyard
2. School service
3. Archaeological workshop
4. Course centre
5. Boatyard depot
6. School service depot
7. Boating society depot
8. Boat shed

Danish designers keep it simple – Arkitektgruppen Aarhus

Stephen Willacy discovers a return to some of the old values of good Danish design when he visits Arkitektgruppen, one of Denmark's most prestigious architecture practices, in Aarhus. Its design philosophy focuses on a combination of "keeping it simple" – using a few, well chosen good quality materials, and emphasising a social awareness infused with professionalism, giving this firm a special status in the Nordic architectural scene.

With over 15,000 homes built since its inauguration in 1968, Arkitektgruppen Aarhus's work has been influential in shaping Denmark's architectural landscape. It began with dense low rise housing association work in the housing boom of the 1970s. Designs were based upon Dutch concepts and international structuralism. These principles were transformed to suit the Danish situation, where scale, local building traditions and the special social aspects of the Danish welfare system were key aspects in the firm's design philosophy.

European influence on urban planning

Later in the 1980s, the trends came from central Europe, following the schools of Leon Krier and Aldo Rossi. "These focused on the city rather than the land developments," Per Feldthaus, one of nine partners, observes. This change of emphasis led to the Ministry of Housing and The Building Directory announcing an invited competition for a new type of living in the city which would incorporate new flexible building production techniques. Arkitektgruppen won this convincingly by "lifting the already developed social qualities from the low rise/dense housing into the air", in a similar manner to Alison and Peter Smithson's "street-decks" concept. This approach won Arkitektgruppen further housing schemes, five of which have been completed to date, with the most recent in the northern part of Jutland in the city of Aalborg.

The original experimental nature of the pioneer projects in Copenhagen, where pre-fabricated techniques were adopted in column, beam and sandwich panels, has been replaced with traditional facing brickwork and concrete innerleaf. The access balconies have however become more relaxed, and possibilities for social interchange are increased by the introduction of glass bay windows and sitting areas. "The wide balconies have become continuous with the inner living areas," concludes Per Fischer, another partner, "this was one of our original design concepts".

Competitions are good practice

The attitude of experimentation and research is well developed in the practice. Per Feldthaus and Per Fischer agree; "We use competitions, to implement a process of analysis and research, to gain experience. It keeps us on our toes and enables us to constantly renew our architecture". This belief seems to work because last year alone the office participated in 25 competitions, winning eight of them, an impressive average by any standards.

Diversifying and restructuring

The EU Service Directive has created new possibilities. Per Feldthaus comments: "The basic foundation for the office's work was housing but this made us susceptible to the changeable economic climate. Today the practice can boast projects that represent over 50 percent of their workload in many new categories. For example in private and national health, commercial developments, mixed-use developments, conversion and restoration projects, swimming halls, sports halls, power plants, airport designs, petrol filling stations for Q8, and work in the education sector. Feldthaus continues: "At Copenhagen airport at present there is a massive investment of 1.5 million krona each day, and we are one of a number of architectural practices working alongside each other on different projects".

This diversity has also been encouraged since the company took on four new partners a few years ago. The principle idea behind this was, according to Feldthaus, "to create a revolution". He continues: "And they have given us one. The younger architects have been given the space to make real changes." Since the "revolution" the new partners have tried to speed up the decision making process. "We have talked about creating a design department over many years, but never really done anything about it. Now, since the restructuring, we have one. The designers are working on light fittings with Louis Poulsen and producing furniture with Hansen and Sørensen which are being sold all over the world."

Designing the landscape

In addition to the new design department, the practice has a landscape architecture department. This concern for landscape has been an integral part of the office design philosophy from the outset. The house and garden relationship is often synonymous with creating a home, whilst the ›

Front row, left to right: Jørgen Bach, Per Feldthaus, Thomas Carstens, Per Fischer
Back row, left to right: Erling Stadager, Ole Nielsson, Michael Harrebek, Helge Tindal, Lars Due

›relationship between the housing complex with the town or village and the neighbouring landscape is so sensitive that a project can fail if it is not designed well. The landscape architects are integrated in the design teams at an early stage in the design process. The landscape department of 15 has had so much success that it is able to take on independent commissions, and is larger than most Danish landscape practices.

Arkitektgruppen also has an office in Copenhagen. Copenhagen is closer to Sweden than Jutland, where Aarhus is the main city. Here with a staff of 15, they are able to have a profile in the capital city. The partners take it in turn to spend a period working there. This constant flux enables the staff to keep in touch with what is going on. Denmark is relatively small, with a population of five million, and the Kattegatet, the expanse of sea dividing Denmark's islands, creates a barrier – although the new Store Belt bridge which carries 21,000 cars a day, does help.

Eye for talent

As with many good architectural practices, the firm has an eye for talent. The office has always had close links with the local architecture school and nearly all the partners are frequent visitors as examiners, or as guest critics, keeping a constant lookout for budding talent. Over the years the office has been the starting point for some of Denmark's younger architect offices, such as Schmidt Hammer & Lassen, Cubo and Nielsen, Nielsen and Nielsen. Arkitektgruppen have developed associations with two of them on a housing project in Aarhus, and a mixed-use development-city square project in Herning, a town in mid-Jutland.

The company's employment strategy has changed over the years, as Per Feldthaus points out. "When we started, it was on a fixed time period, probably because of the fluctuating economy at the time. Unfortunately this had a detrimental effect on occasions as it could create an unhealthy atmosphere, because people were unsure if they were going to be able to continue. Today we employ personnel on a more permanent basis, this means that staff have a term of notice of between three and six months dependent upon how long the person is employed. This inspires a degree of confidence and seems to create a stable working environment."

A challenge for female staff

At Denmark's architecture schools today around 50 percent of the students are female. "Without discriminating against the male students, we employ more women than before, simply because they are very talented. We have approximately 30 percent female staff members today." It will be interesting to see in the future if the women can infiltrate the partnership which is currently comprised of nine men.

Three-phase system

Arkitektgruppen's approach to project development employs a three-phase system.

* Phase one is based upon the client's brief, where the quality and price levels are agreed. Client, consultants and contractors complete analysis schedules, which help to identify critical areas in the process and thereafter set the right people to solve them.
* Phase two is the "dialogue phase", where the contractors, subcontractors and suppliers really get involved and details can be ironed out. This is a crucial aspect of phase two, where there is an opportunity to test the project with the ideas of those who will carry out the work. At the same time economic valuations are carried out, all in an effort to optimise the process. The site management and planning is well on the way at this stage. This provides the basis for making contracts between the client and contractors. It saves time and expense, there is no tender period and no time-wasting.
* Phase three is a process and project optimising period. Here the site situation is thoroughly planned and the logistics organised.

The results to date have been positive, following the completion of several projects. Although relatively small at present the savings have often meant that the firm is one month ahead of schedule with up to five percent better productivity. These savings are reintroduced into the project – for example in one housing project savings have been spent on balconies, which otherwise would not have featured.

Feldthaus says: "The principle idea behind taking on new partners was to create a revolution. And they have given us one. The younger architects have been given the space to make real changes."

Total concept housing projects in Eastern Europe

Arkitektgruppen has a number of projects on the drawing board at the moment in former Eastern Bloc countries. Together with the Danish state, a group calling itself EXXOS is taking some of the welfare state models for sheltered housing for the elderly to Lithuania and Poland. Here a total concept including staffing models is integrated into package designs. Other projects include renovation work on the much-dilapidated concrete housing in the early DDR and Poland. In Berlin a project which started as an office project has been transformed into an apartment scheme. The largest project is to be found in Warsaw in Poland, the 70,000-square-metre World Centre.

Old values of good Danish design

The practice's design philosophy today is the result of changes and developments inclining towards the various international trends over the years. However there seems to be a return to some of the old values of good Danish design a combination of "keeping it simple", with a few, well chosen good quality materials, and a social awareness infused with a wealth of talent and professionalism, which gives Arkitektgruppen a special status in the Nordic architectural scene. VA

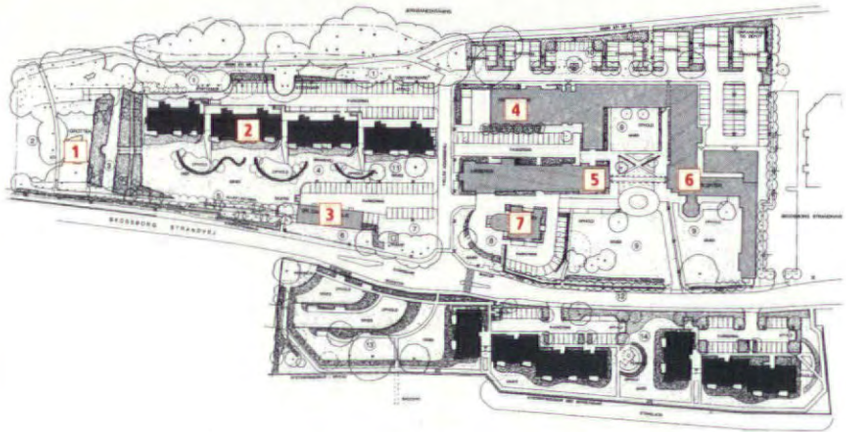
Anglicised spelling of Danish names has been used throughout, in keeping with the firm's title

Housing in Skodsborg Sundpark, near Copenhagen

Located on both sides of Strandvej north of Copenhagen in the so-called "Whiskey Belt", these eight four-storey blocks of apartments afford magnificent views across the strait towards Sweden. The apartments, which vary in size from 84 to 144 square metres, are accessed from a shared stair and elevator space. The new buildings are built in brick and painted white to blend with the neighbouring white stucco sanatorium. A few well-chosen good quality materials are incorporated in the scheme, for example seamed zinc roofing with dormers and coloured aluminium windows combined with redwood panels. The interiors are painted white with floors of mahogany parquet, whilst the doors are in Danish maple. The apartments have a distinct Scandinavian feel, with bright daylit rooms, natural materials, large balconies and close contact with their natural surroundings. The blocks nestle into the coastline and the landscape design department have planned a series of terraces, paths, play areas and recreation facilities in harmony with the natural slopes of the site.

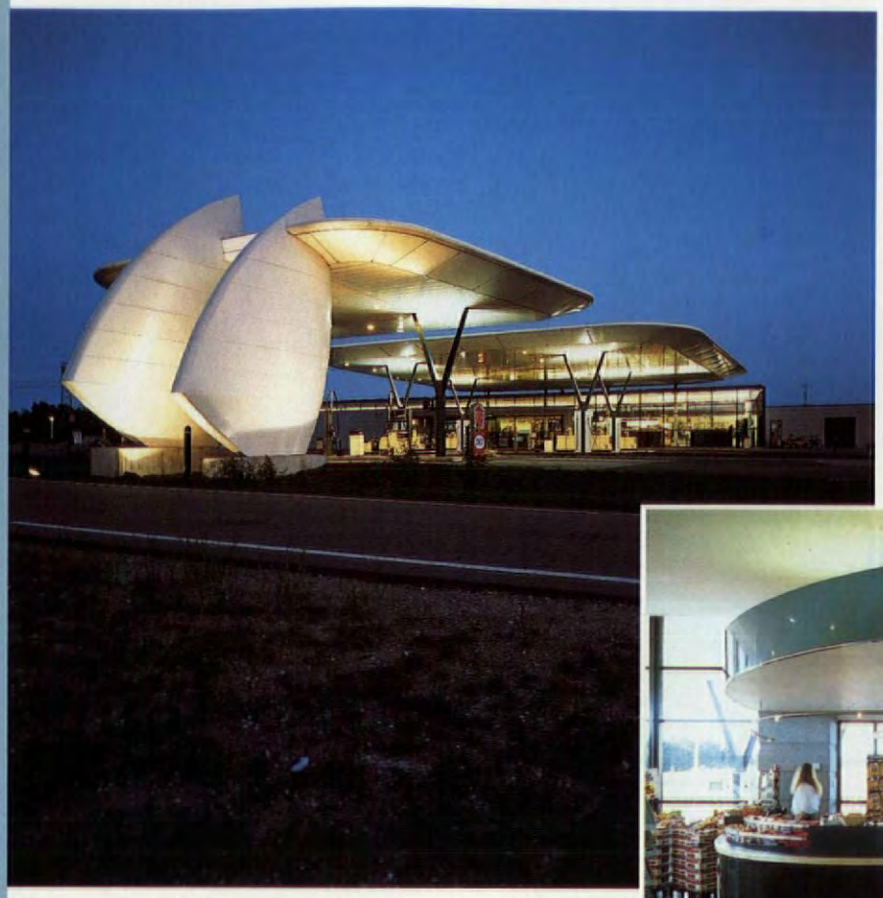
Completion
1995 (external surfaces 1997)
Area
10,600 square metres
Price
115,000,000 krona (US$ 17,750,000)
Project group
Ole Nielsson (partner), Lars Dithmar, Jørn Poulsen, Henrik Mulvad, Jan Fugl, Inge Lykke, Mette Boch. Landscape Arch: Søren Bisgaard

Above: The houses front onto the beach with views towards Sweden. The landscape design integrates the garden terraces with the natural slope of the land
Right: A sensitive choice of materials creates a calm atmosphere



Key to site plan

1. Grotto
2. Housing block
3. G Dauner's Mansion
4. Fitness centre
5. Clinic
6. Sanatorium
7. Villa Rex



Q8 Petrol Service Stations

Arkitektgruppen has designed several Q8 petrol service stations along the E45 motorway in Denmark. Now a new generation is on its way. Following the success of the Great Belt Link since its inauguration this year – the original numbers of passengers envisaged for the project has been exceeded nearly twofold, with an average of 21,000 vehicles per day. It is reassuring to know that with Arkitektgruppens' new proposals, one can take time out, and even have a bite to eat in a high quality architectural environment.

Completion
Four stations 1990, four stations 1998
Area
743 square metres
Project team
1990: Ole Nielsson, Thomas Carstens, Per Feldthaus, Thomas Hjortsberg, Peter Lindberg, Niels Boldt
1998: Ole Nielsson, Kim Rilsager, Søren Øllgaard, Peter Lindberg, Per Christensen

Above left:
Q8 sails in concrete help stabilise the canopy

Left:
The cafe-shop bar designed as a free standing element within the total glass envelope

The Funen Regional Archives

Architect Martin Borck originally built these archives in 1863. This project illustrates Arkitektgruppen's ability to adapt to the problems of building an extension to a well-liked and protected building, without resorting to pastiche.

With its three storeys and full basement, the building is linked to the existing archives building at ground floor level with an oblique-formed glass corridor. The space between the two buildings creates an intimate landscaped courtyard.

The reading room faces the courtyard; the self-service storage facilities are positioned adjacent to this. Above, on the first floor, within the double-height space, the reference library is located on the balcony. A public lunchroom and meeting room are adjacent. The second floor houses the regional archive administration and research facilities.

With its curved roof, and the sense of scale and general proportioning, the new archive building sits harmoniously in its context.

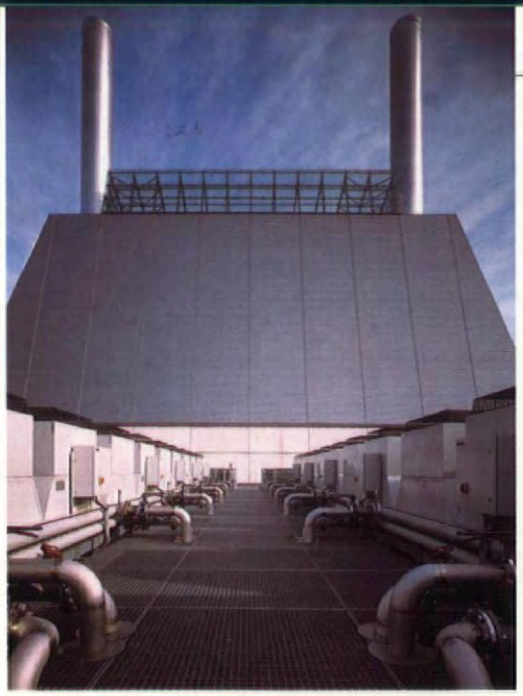
The grid-like sandstone cladding combined with the horizontal fenestration share a high level of precision in detailing, work on a level synonymous with the old handicraft traditions visible in the neighbouring building.

This attention to detail is carried through in the interiors, where specially designed furniture fittings in Danish maple and brass reading lamps, create a learned atmosphere. The foyer space and corridor link floors are made of terrazzo designed by the graphic artist Jes Vomsgaard.

Completion
1995
Areas
New building: 1800 square metres
Refurbishment: 3,800 square metres
Price
25,000,000 krona (US$ 3,858,000)
Project group
Michael Harrebek (partner), Karsten Jørgensen, Helge Davidsen, Lene B. Kristensen, Landscape Arch: Søren Bisgaard

Right:
The reading room faces the courtyard and original archives building from 1893

Below:
The sandstone cladding on the new facade unites the existing gable harmoniously



Silkeborg Power and District Heat Plant

Arkitektgruppen Aarhus won the competition for Silkeborg Power and District Heat Plant in 1993 and completed the project three years later. The plant is powered by a natural gas fired combi-system that produces electricity and district heating.

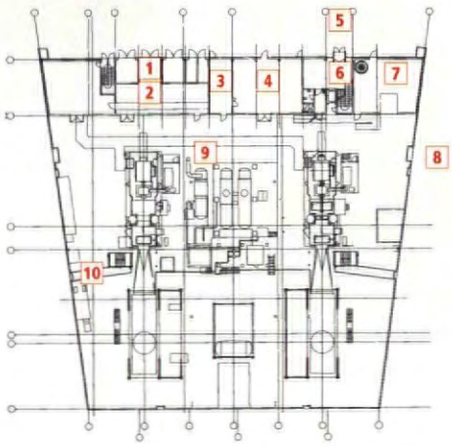
There is a distinct feeling that the futurist architect Antonio Santlia has had something to do with this project. With its sloping walls, chimneys and prismatic roof lights there is a futuristic monumental air about the project. The monolithic nature of the mass is enhanced by using aluminium corrugated sheeting which rests upon a protective white concrete base. All references to scale are positioned in the north facade, where the perforations are positioned in graphite-grey shiny panels. By night the plant is an awe-some sight, sending light over the beautiful forests and lakes of Silkeborg. The result is a *tour de force* in Danish plant design.

Completion
1996
Price
600,000,000 krona (US$92,600,000)
Project group
Per Fischer, Michael Harrebek (both partners) Søren Ÿllgaard, Eigil Nyboe, Jacob Lind Pedersen, Lene Christensen, Landscape Arch Per Christensen

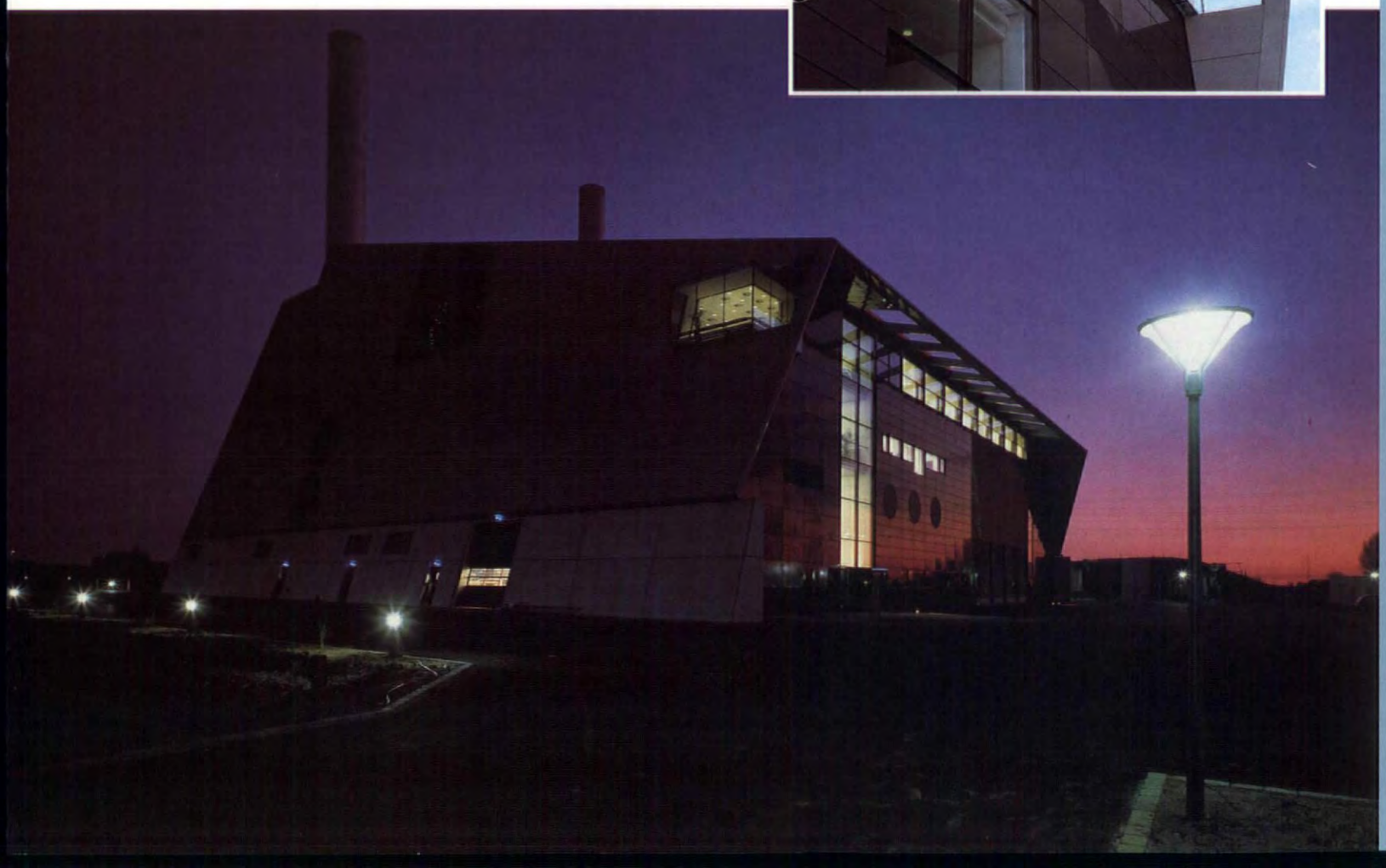
Left:
Technique and architectural form are combined in a futuristic composition

Below:
Elevation detail showing the northerly perforated facade and canopy

Bottom:
Power is transformed to light shining through the metallic surfaces



Key to ground floor
1. Transformer
2. High tension
3. Electrical workshop
4. Repair shop
5. Main entrance
6. Lobby
7. Water treatment room
8. Gate
9. Generator room
10. Escape tunnel



Housing Renovation at Toveshøj Brabrand, Aarhus

The nine, four-storey blocks positioned on the outskirts of Aarhus were built in the 1970s, with pre-cast concrete elements. After only 15-20 years the low-quality concrete was in a state of disrepair. The client, Brabrand Housing Association Toveshøj, asked Arkitektgruppen to solve the problem.

Although the buildings are of a generally high standard compared with many projects of the same period, it soon became apparent that a completely new facade system was necessary.

It was important to respect the wishes and demands of the housing association, and at the same time try to preserve the existing architectural qualities.

The two sides of the buildings demanded different approaches. The garden sides required a total enclosure, because of the serious state of decay. The newly-developed aluminium facade system had to take into account the large tolerances, and respect the underlying concrete decks and jambs. The aesthetic appearance of the system had to be hard edged and as transparent as possible. The final solution was hooked and screwed together with elastic joints. Using a system of sliding windows and sliding doors which lead onto French balconies, Arkitektgruppen has succeeded in giving the buildings a facelift whilst maintaining the original style.

Completion
1996
Number of units
624 Apartments
Price
100,000,000 krona (US$ 15,450,000)
Project group
Erling Stadager, (partner) Rolf Kjer, Lars Kvist, Allan S. Ktistiansen. Landscape Arch: Søren Bisgaard, Lief Ganderup

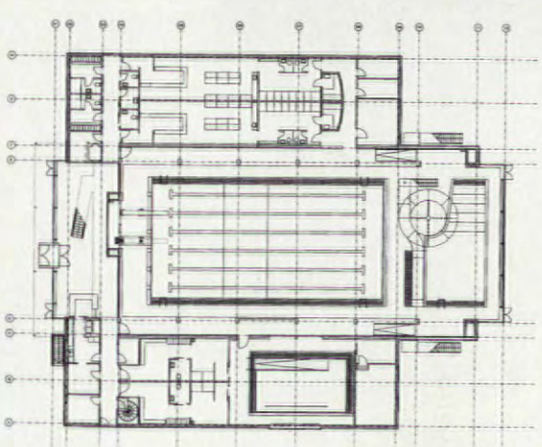
Left:
Close up of exterior covered access stairway in concrete and steel

Above:
Elevation detail showing the extensive use of glass with sharp edge aluminium profiles

Faaborg Swimming Hall

Built in 1997 following first prize in an invited competition this swimming hall is located on the outskirts of Faaborg, situated on the southern coast of Funen. The project has a neo-classical leaning with portico and symmetrical-axial layout. The town's famous art museum designed by Carl Pedersen may have influenced this. The building complex sits on a raised podium thus avoiding too much digging in the difficult underlay. The most characteristic feature of the building is the choice of building block which is golden reddish in colour, and seldom used in Denmark. These blocks are carried into the swimming pool areas. Inside, the indirect daylight along the length of the 25-metre pool enhances the perforated metallic ceiling which appears to float.

Completion
1997
Area
1,800 square metres
Price
28,000,000 krona (US$ 4,320,000)
Project group
Per Fischer, Thomas Carstens, Per Feldthaus, Jørgen Bach (all partners), Peder Worm



Far left:
The 25-metre competition pool seen from the foyer

Left:
Ground floor plan showing central swimming pool spaces held between the enclosed wings

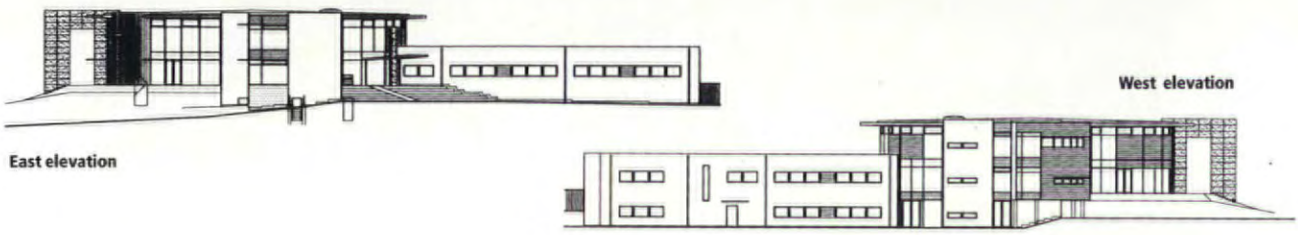
Above:
The finely detailed light-weight aluminium entrance canopy is held in position by the heavy red-yellow block wings

KOE Kokbjerg, new Headquarters

In a recently designated industrial area on the outskirts of Kolding on a green field site, Kolding area Energy Company has a new domicile. From a central rotunda where the reception and vertical circulation are located, three administration wings radiate outwards into the landscape.

Completion
1995
Area
7,700 square metres
Price
70,000,000 krona (US$ 10,800,000)

Project group
Ole Nielsson (partner), Søren Ÿllgaard, Peter Lindberg Christensen, Rolf Kjer, Ole Madsen, Anders Nielsen, Mette Bock, Landscape arch. Per Christensen, Mariann Lyshøj, Lief Ganderup, Britta Mahnecke



East elevation

West elevation

Above:
KOE Headquarters make the maximum use of the greenfield site

Above:
Two glass footbridges connect the annex to the existing town hall and commercial buildings across the square

Left:
The Town Hall annex contains the new main entrance giving the square a monumental feel

Herning Central Square

Herning, a mid-Jutland manufacturing centre, it is probably most famous for its cycling hero, Bjarne Riis, a recent Tour de France winner. Inspired by the projects in Berlin in the 1980s where groups of architects worked together on large projects, Herning Council invited a group including, 3X Nielsen Arkitekter, Arkitektfirmaet Søren Jensen A/S and landscape architect Jeppe Aagaard Andersen and lead by Arkitektgruppen Aarhus to carry out much needed improvements.

By positioning new buildings along an axis symmetrically positioned with the church, the team has succeeded in creating two squares which retain differing characters despite being linked together.

The car parking is located underground allowing the square to become pedestrian. The two new building complexes have different purposes. One of the buildings is an extension to the town hall, but in creating new boundaries and enclosure for the square it takes on a new prominence in the urban scene. Opposite a commercial block with shops and offices creates a balance and coherent transition between the new market-like square and the urban park-like space with its large old trees. These different spaces are further enhanced by the various surface treatments.

The black massive polished concrete walls with small windows act as a base and counterpart for the lightweight skeletal framework made of dark painted aluminium and timber cladding. The two buildings are further manipulated by different treatment of the fenestration. These subtle variations within the scheme create a fine balance between the old and new and give a harmonious balance as a whole. The remaining buildings are carried out in brickwork with a number of different types of window formats.

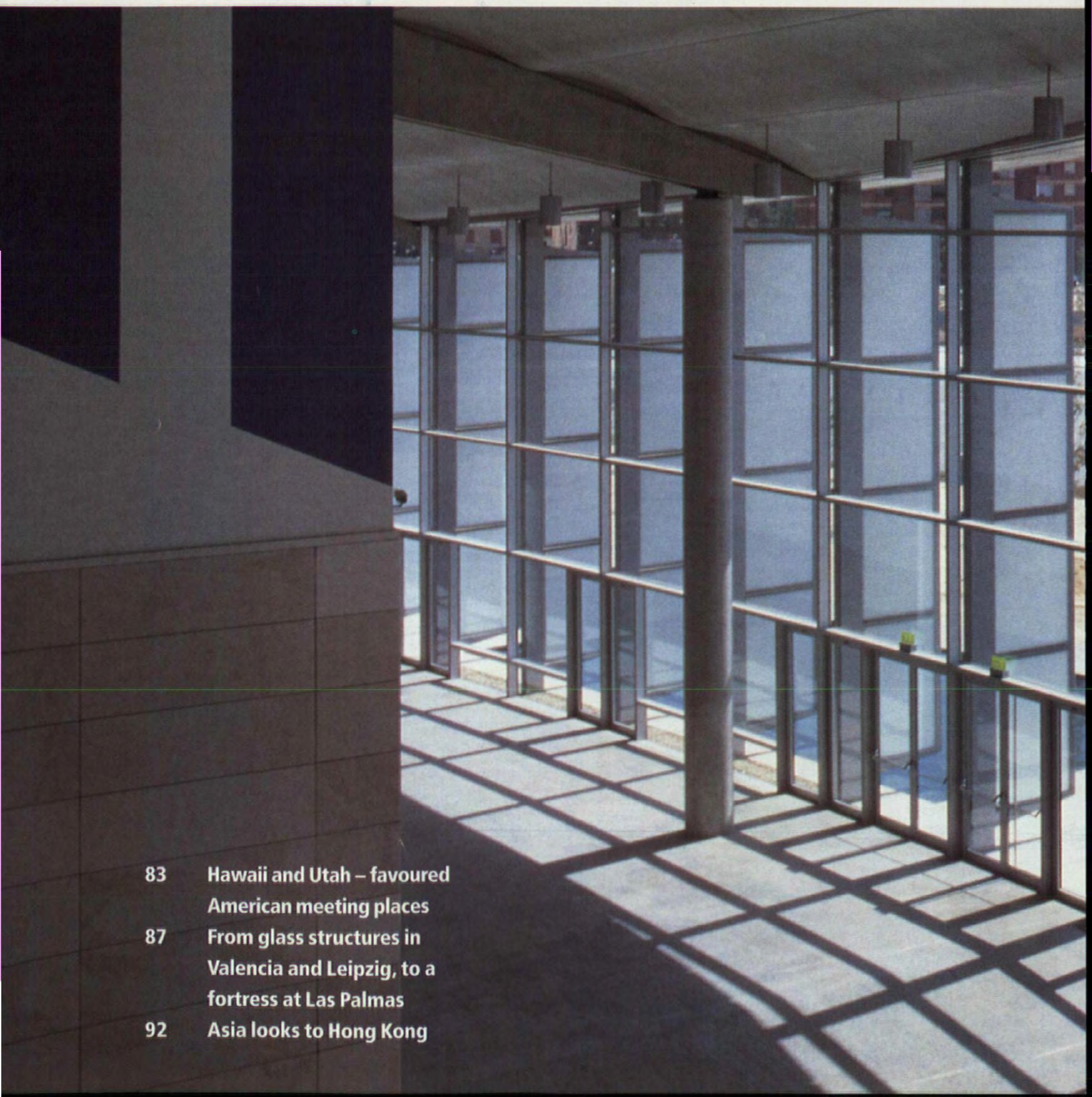
As a whole the mixture of materials, scales and well-controlled sequence of public space has created a relaxed and successful urban development, neatly sewn into the existing urban fabric.

Since completion Arkitektgruppen has won a new competition, this time alone, for further developments in Herning.

Completion
1996 (new extension 1999)
Area
1st Phase: 6,700 square metres, 2nd Phase 6,500 square metres
Price
Approx 180,000,000 krona (US$ 27,775,000)
Project group
Per Feldthaus(partner), Askel Fyhn, Asbjørn Gregersen, Carsten Olsen

Sector Analysis – Convention centres

The global boardroom



83 Hawaii and Utah – favoured American meeting places
87 From glass structures in Valencia and Leipzig, to a fortress at Las Palmas
92 Asia looks to Hong Kong

Foster and Partners' Valencia Congress Centre solves the problem of heat gain by placing vertical opaque glass fins at regular intervals along the curtain wall
Photo: Nigel Young

If you fear that innovations in telecommunications might eventually obviate personal contact, consider the convention centre boom. People gather in a growing number of ballrooms and exhibition halls to plug in their laptops and flip open their cellular phones. Chuck Twardy interviews architects from North America, Europe and Asia to find out why people can't stand to work alone.

McCormick Place, Georgia, US
by Thompson, Ventulett,
Stainback and Associates
Photo: Brian Gassel/TVS&A

Baltimore Convention Centre expansion, US by LMN Architects

AMERICA

Meeting facilities are popping up everywhere, but "In North America right now the activity is really beyond belief," says Larry Oltmanns, a partner at Skidmore, Owings & Merrill.

The *Wall Street Journal* reports that the average conventioneer spends about US$200.58 a day, whereas the average tourist spends about US$110.36, which explains why cities with guaranteed tourism are getting into the game. Atlantic City recently opened a US$268 million convention centre with 46,450 square metres of contiguous exhibition space, designed by Wallace, Roberts & Todd. And Honolulu will soon open an LMN-designed US$200 million convention centre with a 18,580-square-metre exhibition hall, 49 meeting rooms and a 3,345-square-metre ballroom.

Existing facilities must expand or loose out

As cities of all sizes build new convention centres, those that have them find they must expand to compete. C Andrew McLean, principal at Thompson, Ventulett, Stainback & Associates (TVS & Associates) of Atlanta, estimates more than half of the firm's convention centre work involves expansion. Moreover, "the additions are going up in size".

Partner Thomas W Ventulett III points to the ❯

Hawaii Convention Centre, Honolulu, Hawaii by LMN Architects

The new Hawaii Convention Centre takes its design cues not only from the Hawaiian Islands' vernacular architecture, but also from their volcanic forms.

"The massing of the building follows the profile of the island," says George Loschky, principal designer with LMN Architects of Seattle, which built the 102,190-square-metre Honolulu facility with design-build partner Nordic/PCL. The local firm Wimberly Allison Tong & Goo collaborated, mostly on the interior spaces.

"We really tried to take an approach of the building as landscape," says Loschky. The massing and circulation recapitulate the layered lava-formations of the islands. A waterfall cascades down three levels from the one-hectare rooftop garden overlooked by the ballroom's pre-function area. The roofline over the registration lobby is studded with sweeping white forms that suggest Polynesian sails, whitecaps and tropical flowers.

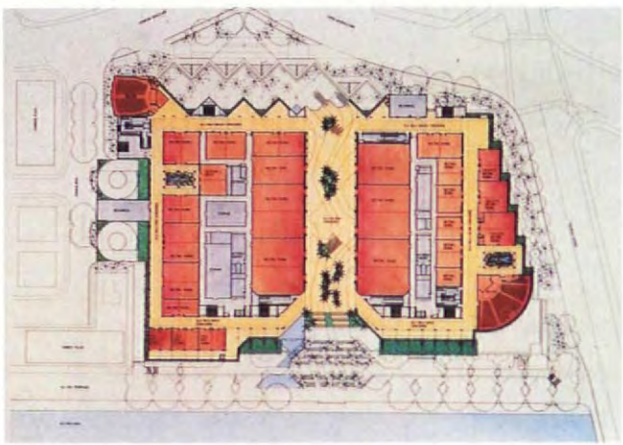
Because of the temperate climate and prevailing trade winds, LMN was able to blur boundaries between interior and exterior. The suspended glass wall of the 3,250-square-metre lobby encloses palm trees and a 20-metre waterfall. The main concourse is skylighted but open-air, also with palm trees. The scents of bougainvillea and other tropical flora waft throughout the facility.

A grand stairway leads from the concourse to a promenade along the Ala Wai canal, and LMN took the counter-intuitive step of putting service areas on this prominent frontage. The truck docks, however, are masked by a rock embankment. "There is no back to the building," Loschky observes.

Equally unusual is the placement of the car park, with room for 800 cars, on the second level, above the 18,580-square-metre exhibition hall and below the 9,940 square metres of meeting rooms. An innovative structural truss system was arranged to allow 17.5-metre parking lanes on the upper floors.

The double-pitched, sea-green roof over the principal structure mimics a traditional roof form found throughout the Hawaiian Islands – albeit on a much smaller, residential scale. Given this vernacular touch, the openness of the buildings and the intimations of the Hawaiian landscape, says Loschky, "the whole building really became a metaphor of the islands".

Jeff Goldberg



Left:
Meeting room level of the Hawaii Convention Centre, LMN Architects
Above right:
Exterior of the convention centre
Right:
The tree-like columns in the interior

Salt Palace renovation and expansion, Salt Lake City, Utah, by Thompson, Ventulett, Stainback & Associates

Incorporating a building that is locally scorned, complementing an orchestra hall and a museum and striking a high note within shouting distance of the Mormon Tabernacle Choir is a challenge for a convention centre.

The new Salt Palace in Salt Lake City not only engulfs much of its maligned predecessor, adding meeting rooms to what had been the lobby, it creates a dramatic new entrance for an adjacent museum and orchestra hall, and announces its presence at the terminus of a long avenue with a 30.5-metre tower.

H Preston Crum, design principal for Thompson, Ventulett, Stainback & Associates, says the firm had to account for the spare, minimalist aesthetic of the art museum and orchestra hall, and did so by replicating the pale brick in the new building. These adjacent facilities were better-liked by the community than the old Salt Palace, much of which was razed. But local leaders did not want an unobtrusive replacement. "They urged us to be a little more dramatic," says Crum.

Hence the cylindrical glass entrance tower, which marks the convention centre in the civic landscape – especially at night, when it is lighted. The 180-metre-long front facade is broken into a series of visual experiences, including a secondary entrance tower and a sequence of wind sculptures that Crum likens to "a string of jewellery".

Often, the concourse connecting various parts of a convention centre is along an exterior wall, but for the Salt Palace, TVS & Associates prescribed an interior concourse under a curved roof with banana trusses. Large clerestories allow natural light into the space, filtered through a snowflake pattern that hints at the area's ski attractions.

On the main level, you can leave meeting rooms and enter the exhibition hall directly across the concourse. "The exhibitors love that," says Crum. Also likely to please them is the fact that you can look down into the hall from second-floor windows.

The project also added a 3,345-square-metre ballroom and adjacent kitchen facilities that, says Crum, "wouldn't have been considered 10 years ago". Today, however, it's *de rigueur*, because, as Crum explains, "various conventions want to get everyone in one room".

Left: Salt Lake Convention Centre by Thompson, Ventulett, Stainback & Associates

Atlantic City Convention Centre by Wallace, Roberts & Todd

›firm's first convention centre, the Georgia Congress Centre, which opened in 1976. A second phase in 1985 doubled the size. In 1992, TVS & Associates added another addition equal to the last expansion, and it was recently commissioned to expand the centre again.

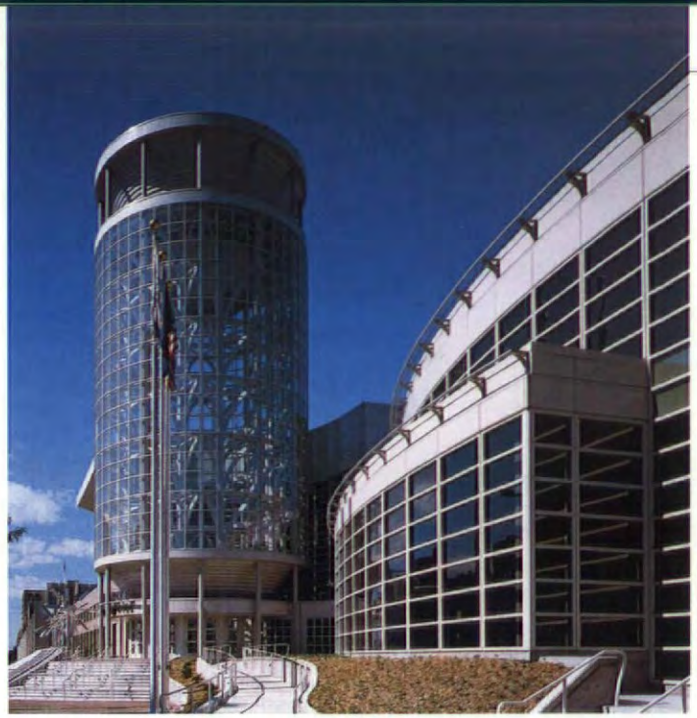
"Many of our repeat customers started to outgrow us," says Peggy Daidakis, director of the LMN's Baltimore Convention Centre, which last year completed a US$151 million expansion from 40,000 to over 100,000 square metres. The customers swell in both size and in number, she adds. Some grow until they divide into smaller groups.

Serving the city

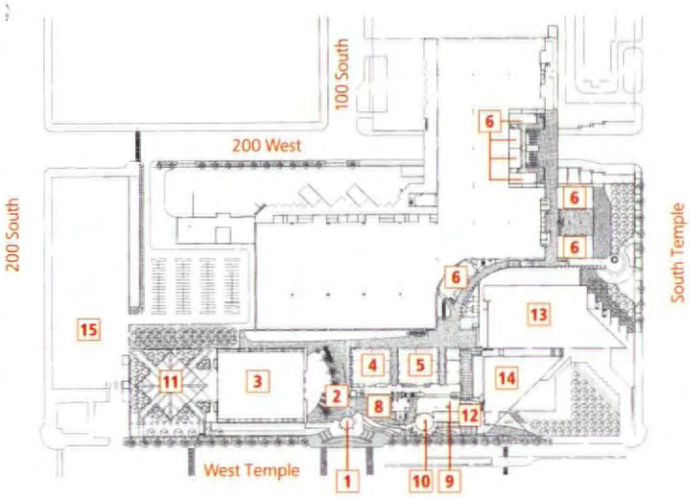
The question arises to what extent convention centres, which are both huge and expensive, should serve the cities they occupy.

"I think it's also fair to say that historically the architects have not done a very good job of integrating the convention centre into the city," says SOM's Oltmanns.

In some cases, politicians have chosen cheap land on the downtown fringe, losing the opportunity to connect with the city centre. This was the case with Chicago's McCormick Centre, which last year completed a multi-phase expansion to nearly 280,000 square metres. Both SOM and TVS & Associates worked on parts of the



Above: The light tower at the Salt Lake Convention Centre. Transparency is the predominant design feature



Key to concourse level plan

1. Entrance tower
2. Lobby/prefunction
3. Ballroom
4. New exhibit hall
5. Existing exhibit hall
6. Meeting rooms
7. Concourse
8. Registration
9. Office
10. Visitors' centre
11. Ballroom plaza
12. Arts centre plaza
13. Existing symphony hall
14. Existing art centre
15. Existing parking deck

North American convention and exhibition centres

Building & location	Year	Square metres	Total cost (US$)	Cost/$m2	Factored*
Miami Beach Convention Centre Miami, Florida	1987	55,740	50,000,000	$897	$1,442
Moscone Convention Centre San Francisco, California	1987	52,953	135,942,000	$2561	$2,905
Oregon Convention Centre Portland, Oregon	1988	45,914	54,240,766	$1,184	$1,571
Las Vegas Convention Centre Las Vegas, Nevada	1989	56,992	63,802,000	$1,119	$1,506
Dallas Convention Centre Dallas, Texas	1990	48,745	58,926,837	$1,205	$1,872
Austin Convention Centre Austin, Texas	1991	38,089	50,000,000	$1,313	$2,044
First State Centre Wilmington, Delaware	1992	15,714	23,495,750	$1,495	$2,044
Sacramento Convention Centre Sacramento, California	1992	26,352	47,084,283	$1,786	$2,044
Convention/Exhibition Centre Mexico City, Mexico	1993	21,699	24,877,097	$1,151	$1,657
St. Paul Civic Centre St. Paul, Minnesota	1995	40,484	60,246,935	$1,485	$1,679
Baltimore Convention Centre Baltimore, Maryland	1995	89,741	145,060,508	$1,614	$2,120

All facilities are single level, ie not double decked.

project, and both claim some credit for re-orienting the McCormick to the city.

But the city centre facility might be a big, blank-faced box that ill-suits the context. TVS & Associates has addressed this issue with signature elements, such as the "light tower" that announces the Salt Lake City renovation, and a series of wind sculptures that animate its ballroom facade. But convention centres also hinder urban vitality, as some residents of Washington DC argued during planning for a new convention centre, another TVS & Associates project. "It's a reasonable concern, because they have preconceived images of some of these other ones," says Ventulett.

McLean says TVS & Associates attended neighbourhood meetings and tried to accommodate concerns. District height restrictions pushed exhibit halls below grade. The architects decided to put meeting rooms at street level, creating a glazed, welcoming presence, with retail around the periphery. Truck docks are above street level, ameliorating a typically unpleasant facade.

Balancing the books

The Washington project is expected to cost as much as US$650 million, according to *The Wall Street Journal*, which also asked if the expense is worth it. Los Angeles, the *Journal* observed, added 36,000 square metres to its convention centre in 1993, hoping for 3.7 million visitors by 1995. But only 1.3 million visited, and the shortfall in expected tax revenues meant the city had to tap other sources to pay off US$21 million in bond debt. Nonetheless, it recently added another 15,000 square metres.

Convention centres "rarely cover, over the long term, their actual costs," says Marc V Levine, director of the Centre for Economic Development at the University of Wisconsin-Milwaukee. The demand for meeting and exhibition space increases, but supply continues to outpace it: "The market if not saturated is pretty darn close to it."

What makes a convention centre?

- If the building is designed to allow good **circulation** of conventioneers it will enhance the success of events held there.
- "Headquarters" **hotels** grace the most recent convention centres. The success of a centre depends on the proximity of hotels, and some cities mistakenly assume a convention centre will attract hoteliers.
- **Wiring** must be compatible with the very latest IT being used by the coventioneers. In Baltimore a tunnel for electrical and fibre-optic lines runs under the hall and meeting rooms.
- Although city authorities build convention centres, **marketing** is left to local convention and visitor bureaux, which usually receive funding through meal and hotel room taxes.
- **Pre-function facilities** can include small laptop platforms for visitors.
- **Lobby areas** are the sites of much meeting and greeting, and are becoming less utilitarian, but a balance must be struck between elegance and the "food and foot" traffic of thousands.
- Convention centre users crave the **flexibility** to create their own *milieux*.
- Of great significance to meeting planners are more mundane concerns, such as an efficient **entry and exit for trucks**.
- Ease of **entry and exit for the conventioneers** is also crucial.
- **Location** should be considered for tourists and convention clients, remembering that the latter spend the most.

Current design trends *provided by Hanscomb*

The image of the convention centre as a large and dull windowless box, or a "box with docks" as they have been called in the recent past, has been changing rapidly due to the following factors:

- City governments are now realising that these centres are often seen as the window into the heart of the city, and as a result architectural design has been considerably elevated.
- Architects have responded by placing the circulation concourses open to the city, with the "big boxes" relegated to internal spaces and attention lavished on exteriors.
- There is increasing public input into the design and siting of the centres. Andy McLean, of Thompson, Ventulett, Stainback & Associates, Atlanta, Georgia, says that his firm is now spending more and more time in public design reviews as there is increasing awareness that the centres must be made part of the fabric of the city. He points out that this has certainly had an effect on cost, as plain facades have become a thing of the past.
- Partly due to these facts as listed above and also because of an increasing scarcity of land in city centres, (which has been true in Europe and Asia for some time), centres are being increasingly "double-decked" and this can have a dramatic effect on cost, as discussed later.
- Operators and the convention-going public alike are demanding upgraded amenities, for example retail facilities, coffee shops, relocation areas and improved finishes throughout.
- Finally, there are increasing requirements for the "universal" floor for exhibition areas, leading to heavy power requirements and no structural limitations, all of which are intended to provide greater flexibility for the user.

› Too often, says Levine, cities rely on feasibility studies tailored to tell local boosters what they want to hear. "No consulting company ever got more and more contracts by telling cities not to build convention centres," Levine comments.

Joint venturing with tourism

The prospects are best in cities that naturally draw tourists, he says, perhaps confirming some wisdom in the plans of Hawaii or Atlantic City. Other cities find that a convention centre alone will not attract visitors, and their buildings host mostly local events.

Obviously, a balance is ideal. A comprehensive plan that includes hotels and attractions for both the visitor and the resident would seem to be the most likely candidate for success. Hartford, Connecticut, recently unveiled plans for a massive civic development in its downtown that would include a convention centre, a domed stadium and an entertainment, retail and residential district, with the expected US$1 billion cost split among city and state governments and private investment. SOM's Oltmanns has seen the model work in Asia.

"It's not just one building in the city," he asserts. "It should be part of the planning for a district of the city and for the city as a whole."

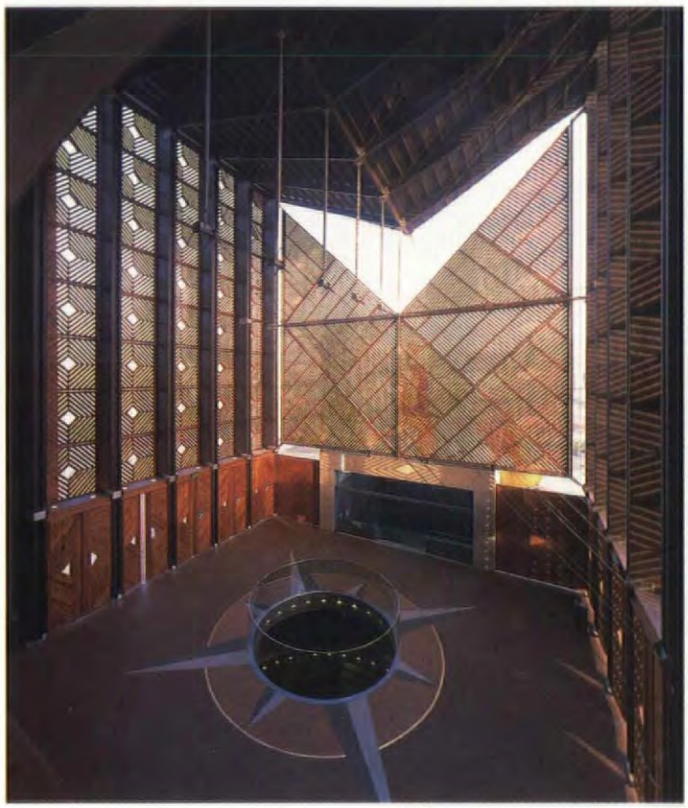
EUROPE

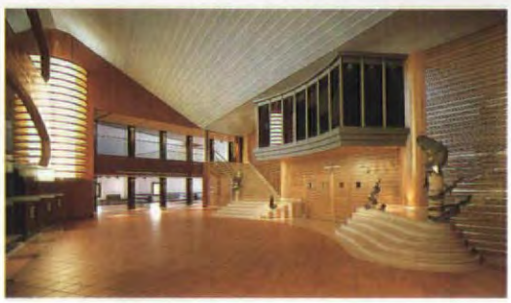
In the foyer of the new Congress Centre Messe Frankfurt hangs a relief of St Bartholomew, marking the twelfth-century opening of the city's first official trade fair.

The plaque also indirectly acknowledges the long tradition of European trade fairs in cities, such as Frankfurt or Leipzig, that anchored crossings of trade routes. Contemporary convention centres are logical extensions of this tradition, adding meeting facilities for both profit and non-profit groups.

Trade fairs

"All over Europe trade fairs have created a





Far left:
The open air entrance foyer
Above:
The rubble stone walls are set on a base of volcanic rock
Left:
An elaborate sculptural programme by Juan Bordes populates the exterior and public foyers with fantastic twisting sea creatures

Alfredo Kraus Concert Hall, Las Palmas, Spain, by Oscar Tusquets

The Alfredo Kraus Concert Hall is one example of an increasing number of cultural buildings designed, for commercial reasons, to accommodate conventions. In this case the seaside setting is key to attracting delegates.

A castle, a lighthouse or the prow of a ship breaking the waves: these are some of the images architect Oscar Tusquets invokes in his design, a play of associations gives the monumental structure a dream-like dollhouse quality. Rising from the western end of the Cantera Beach in Las Palmas, Gran Canarias, the building is visible from the entire northern rim of the city, a solitary stone monolith in the hexagonal shape of its concert hall, crowned by a tall glass lantern that admits daylight to the hall and acts as an illuminated beacon at night.

Overlooking the sea, a proscenium-height glass wall behind the orchestra and choir offers views of rolling breakers to concertgoers, a conceit introduced in Spain by F J Sáenz de Oíza's 1990 seaside Festival Theatre in Santander. An elaborate sculptural programme by Juan Bordes populates the exterior and public foyers with fantastic twisting sea creatures. The landscaping, by designer Beth Figueras, features sand dunes and gardens set in triangular-shaped craters of volcanic rock, a strategy adapted from traditional local farming that protects vegetation from rough sea winds. The rubble stone walls are set on a base of volcanic rock, and complemented by the wood lattice-work of the open-air entry foyer and the stainless steel of the lantern, with translucent glass by artisan Pere Valldepérez.

The 1,700-seat auditorium was designed with the collaboration of German acoustical specialist Lothar Cremer. The large height differences between terraced banks of seating create vertical wall surfaces for optimum sound reverberation, as in Hans Sharoun's 1963 Berlin Philharmonic Concert Hall, also by Cremer. The building includes support facilities for performers and convention delegates. The building is a joint project of the Spanish state, the autonomous regional government of the Canary Islands and the city of Las Palmas. Planned 15 years ago but subjected to delays and a site change, it was finally built on the present site for the relatively modest cost of US$21 million, and inaugurated in December 1997. *David Cohn*

demand for convention centres," observes Karl-Heinz Richter of the German Convention Bureau. "Competition is very strong globally right now."

The number of international association conventions, or congresses, continues to grow, with nearly 60 percent held in Europe, according to the most recent (1996) statistics compiled by the Union des Associations Internationales. A slight decrease in Europe's market share has not dulled the enthusiasm for building convention facilities, often congress halls connected with a city's trade fair exposition facilities.

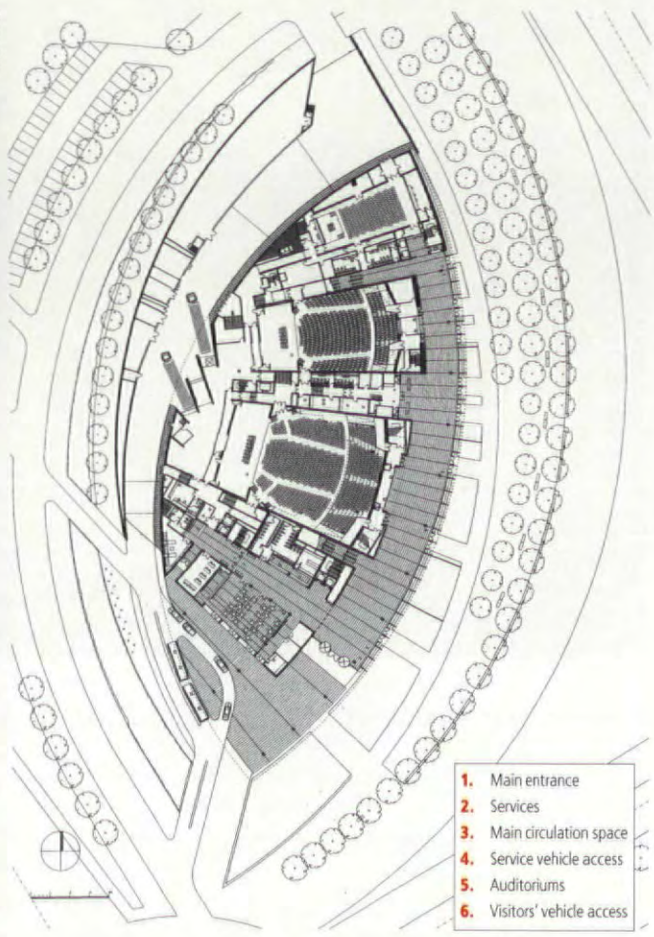
A significant amount of activity seems to be taking place in Germany, fourth on the UIA's list, after the US, France and the UK. The new Messe Frankfurt Congress Hall designed by JSK Perkins & Will, a glass-curtained semi-circle with a hotel on top and a flexible hall with a capacity of 2,200, connects directly with exhibition halls. Munich this year opens its new International Congress Centre by Kaup, Scholz Jesse, which connects with that city's new trade fair and has conference rooms integrated with exhibition facilities.

Exhibition capitals

The *Financial Times* reports that in Berlin, "the exhibitions capital of the world," US$2.2 ›

Congress Centre Frankfurt, Germany designed by JSK Perkins & Will

Nigel Young

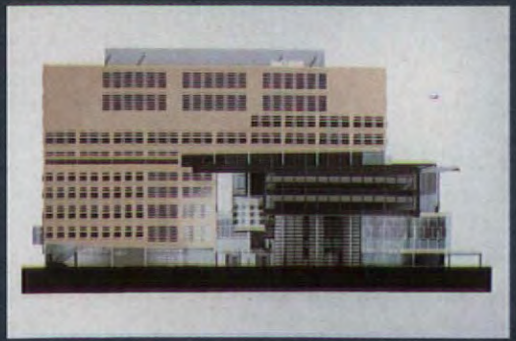


Above left:
Exterior view of Foster and Partners' Valencia conference centre, showing the cantilevered open air entrance

Above right:
Ground floor plan of the conference centre showing three auditoriums separated by circulation spaces

Below:
Elevation showing the organic swooping roof line that has elicited comparisons to Le Corbusier's chapel at Ronchamp

Facing page:
Convex curve of the main circulation area showing the opaque glass fins on the exterior facade



The De Doelen Centre, Rotterdam by Hoogstad Architecten

›billion is being invested in venues over the next four years. In Leipzig, the post-DDR authorities decided that the city's ancient, in-town "Muster Messe" would prove inadequate for expansion plans, and the city instead built an entirely new convention centre complex that opened in 1996.

The former east is eager to reap the rewards of convention-delegate spending. The Prague Congress Centre (formerly the Palace of Culture) is being renovated for a World Bank and International Monetary Fund meeting in 2000. The Czech Ministry of Finance gave US$58.8 million in loan guarantees to back financing for the project.

Cities of all sizes are building facilities to meet the demands of smaller, internal and intra-European congresses and conventions. For instance, in 1993 Tours, France opened its Vinci Conference Centre, with a sweeping, tapered design by Jean Nouvel. Its three congress halls seat 2,000, 700 and 350 and its exhibition area of 2,500 square metres accommodates 110 exhibitor stands. The US$87.5 million facility has hosted 705 events, nearly 80 percent national, regional or local.

Rotterdam will open a moderately sized addition to its De Doelen Centre next year. The US$54.5 million project includes a congress hall to seat 700, an addition of 1,000 square

Nigel Young

Congress Centre, Valencia, Spain by Foster and Partners

One of Foster and Partners' most recently completed projects is a congress centre in Valencia, south-eastern Spain. The building shows the lessons learned from other recent Foster projects. The Valencia centre resembles the hangar-like aircraft museum in Duxford, UK (*WA*64) with its vast curtain wall, but in function it echoes the "Armadillo" conference centre in Glasgow, UK (*WA*61). His latest centre has solved the heat gain problem of Duxford by placing vertical opaque glass fins at regular intervals along the curtain wall, and it has solved the complicated articulation of space at the "Armadillo" by using clear lines and monumental staircases and generous, coherent circulation spaces. Foster told *WA* that he wasn't aware of a heat gain problem at Duxford since the glass wall faces north and that the "Armadillo"'s design was dictated by its Glaswegian industrial context. After visiting all three buildings, however, it seems obvious that the Valencia building is by far the most efficient solution.

Valencia's mayoress, Sra Rita Barberá is extremely pleased with the result. Like other European mayors, she is determined to put her city on the world map and has decided that architecture, and more specifically, Foster's architecture, should do the trick. The building is the focal point of a new area of urban development adjacent to the Avenida Pio XII. Other areas of the city are focused around other international architects – Santiago Calatrava's design for the new Science Centre is only one year away from completion, for example. The centre provides three main auditoriums, each with simultaneous interpretation booths, and nine smaller seminar rooms along with administrative offices, exhibition, retail and support areas and the centre's catering facilities, which can serve up to 1,100 people.

The design is dictated by light which Foster claims is the quality which most impressed him about this desert landscape. Light is drawn in, filtered and sculpted, in places entering gently and in others forming fine piercing rays. Reflected light enters from the perimeter pools that step down towards the building's entrance cooling the surrounding air. Critics who have suggested links with Le Corbusier's Ronchamp are doing Foster a disservice – this building is about transparency rather than form. *KM*

metres to the present 8,000 square metres of exhibition space and eight breakout rooms of various sizes. The present centre is a cultural complex with two concert halls, built in 1952, one of the first buildings constructed in Rotterdam's bombed-devastated city centre. A conservatoire is also part of the expansion, but it does not connect with the meeting facilities. Architect Jan Hoogstad calls the commission "a complex task".

Expansion in Europe

The expansion was launched in 1990. "That's normal for this kind of design," says Hoogstad, although one of the intervening changes was the updating of telecommunications capacities, including connections for each seat in the hall: "In 1990 there was not a need for telecommunications." Hoogstad prescribed spacious dimensions for seats, aisles and "pre-function" lobby areas. He was also keen on creating a pleasant atmosphere that would generate interaction, something he says he found missing on inspections of similar sized facilities in Paris, Birmingham and Tours.

Nico Meyer, senior consultant at the Netherlands Convention Bureau, says expansion plans are being considered for the country's other major convention centres, as cities try to keep pace with business. "It's booming," he says. "1998 is a very good year for the Netherlands. It's very hard to get a room there." As it is everywhere, the name of the game is filling hotel rooms, and the closer the hotel, the better. One is under way to complement the De Doelen expansion. The Netherlands Convention Centre has one on top.

Competition is heating up

Primary international competition, he says, is with London, Paris, Barcelona, and Edinburgh, although Eastern Europe is nudging into the market, too. "You can't compete with their labour cost," Meyer

›

Neue Messe Leipziger, by von Gerkan Marg und Partner

With the demise of the German Democratic Republic, Leipzig found itself with an outmoded and unworkable trade fair, the remnants and rebuilt units of a meeting and exposition complex built 80 years earlier and largely destroyed in World War II. Leipzig's Convention and Trade Fair Corporation officials were eager to regain the city's prestige as a trade fair centre, which Leipzig had lost to western German rivals. However, they knew that the old site would be impracticable.

Instead they chose a non-descript industrial region on the city's northern frontier, close to the autobahn network. The Hamburg firm of von Gerkan, Marg und Partner (GMP) was selected from an invitational competition in 1992 for a scheme that put a human face on an otherwise rigorous modernist rationalism.

›observes. The answer, he says, is to counter with high-quality facilities, both in terms of technology and friendly, appealing atmosphere. But there is only so much advantage to be gained on those grounds, he adds.

"You can hardly find a bad convention centre around any more," says Meyer. "It's people who can make or break the success of your meeting." For architects, this can only mean paying attention to behind-the-scenes areas in which the people who run the centre, from cooks and janitors to administrators and marketeers, must work.

"You have to be very good in marketing," Richter asserts. This ranges from preparing lively brochures and organising persuasive tours for meeting planners to the obligatory page on the World Wide Web. Some of these can be quite engaging. At the Edinburgh Convention Centre's site (www.ecc.scot.net), for instance, you can take a "virtual tour" of the facility.

Trading culture

Because they generally are located in the city, and often are combined with trade fair and cultural complexes, European convention facilities also tend to serve the local public in addition to attracting tourists. Hoogstad points to the De Doelen Centre, a large complex in a relatively small city, in a relatively compact country. "It is necessary to bring different functions together," he says.

Nonetheless, as in other parts of the world, convention centres require subsidies to stay afloat. "I doubt if one of the convention centres in Europe make a profit," says Richter.

A self funding convention centre is unusual because all cost more to run, in terms of operations and debt service, than they earn. This is particularly true in an overheated market, in which competition demands the lowest possible rates. Most cities count on making back some of their costs in tax receipts, but they look upon convention

GMP prescribed a linear arrangement in a shallow, landscaped valley, with a congress hall and exhibition halls bracketing a spectacular, central "Glass Hall". This 19,440-square-metre entrance hall, 80 metres wide and 30 metres tall at its apex, is enclosed by a skin of clear glass suspended from ten arched trusses. GMP collaborated with UK architect Ian Ritchie on the hall, whose spiritual antecedents include Joseph Paxton's Crystal Palace (1851).

Natural lighting is a hallmark throughout the complex, even in exhibition halls, for which blank walls are the norm worldwide. The generous spaces, daylighting, landscaping and use of wood for handrails constitute much of what architect Volkwin Marg points to as the humanising elements of the US$1 billion, 272,000-square-metre complex. Although uncompromisingly hi-tech, the complex also draws on architectural history, for instance in the colonnaded hall of the east entrance.

At the same time, separating various spaces, rather than putting them under one roof as is the trend, allows the Leipziger Messe to serve a number of different, small functions at one time. The combination of easy access, flexibility of use and striking design should help the Leipziger Messe recapture business and compete in a booming sector "It's their only chance," says Marg, "they had lost their market".

Once it is regained, the Leipziger Messe can consider expanding along GMP's rational axis, future halls overtaking present parking. "It has the option to grow," says Marg, "and to grow sensibly. Fair grounds are just additions of different periods and show the lack of long, determined planning".

Facing page:
Leipzig's glass structure is reminiscent of the Crystal Palace which housed the first international exhibition in London in 1851
Below:
Drawing showing von Gerkan Marg und Partner and Ian Ritchie's structural design

How costs can get out of control: Berlin Exhibition Centre (Messe) expansion

One of the keystone projects of reunited Berlin in the early 1990s was a major expansion of the Exhibition Centre from 97,000 to 160,000 square metres. In the "good old days" there was very little attention to the costs of major projects in Berlin as they were subsidised by the Federal Government. For example, the price of the International Conference Centre – built at the exhibition site in 1979 – escalated from US$167 million to US$500 million before it was completed. Some of the old attitude continued to prevail as the first designs for the expansion were produced. Estimates indicated a probable cost in the region of US$1.6 billion. This had to be trimmed significantly to US$1.1 billion, in the new environment of more responsible cost control of public sector projects, reducing federal subsidies and other investment in the newly re-united city.

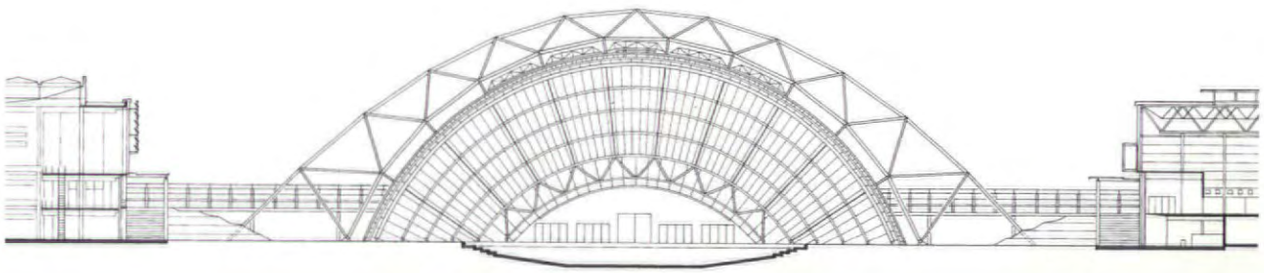
Hanscomb was brought in as project manager and the first task was to value engineer one third of the cost out of the project – a seemingly impossible task. However on closer examination, it became clear that there was a lot that could be done. Subsequently major design changes took place without affecting in any way the net usable exhibit area. This was mainly done by:

- Removing features that had been introduced to accommodate Berlin's bid for the 2000 Olympics, retained after the bid failed but not necessary for the program.
- Elimination of a provision for open air exhibits on roofs of the halls – a huge saving.
- Major changes to the exhibit hall servicing configuration saving considerable sums in smoke exhaust, ventilation and fire protection.
- Reduction in clear spans with little effect on operational efficiency.

These and many other design changes, coupled with a more aggressive procurement policy, brought the cost in line and saved the project.

The final phase of the work is now moving to completion.

Gross floor area	187,000 square metres
Construction cost	US$703 million



centres as investments that benefit the entire community because they lure high-spending visitors. This is why most convention centres aim to attract events that bring visitors from other cities rather than events to serve the local populace.

ASIA

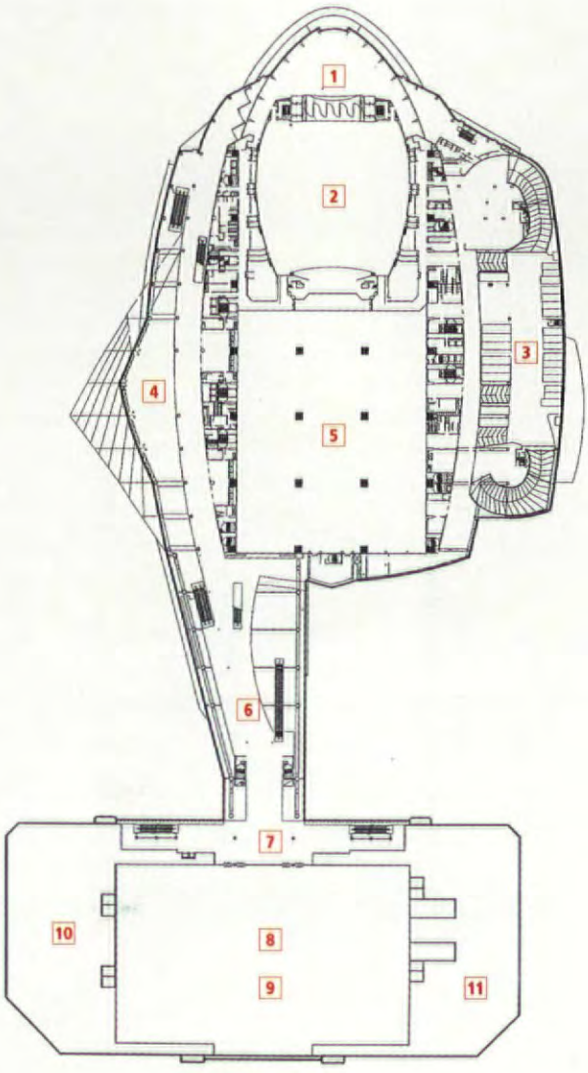
The currency crisis and subsequent economic slowdown might have bottomed-out, at least temporarily, the growth in Asian convention centres, but until a year ago, cities were building meeting and exhibition facilities at an impressive pace.

"During the past four years, there has been a fairly steady growth," observes John Christison, former chairman of the Asia Pacific Exhibition and Convention Council, and current chairman of the World Council for Venue Management.

Christison points out that until recently the focus in Asia, as in Europe, had been on trade fair and exhibition facilities, until governments discovered a lucrative and growing meetings market. Even then, the emphasis remained on exhibition halls, with convention facilities complementing them.

Take, for instance, the new Tokyo International Exhibition Centre, designed by ›

The Queen Sirkit National Convention Centre, Bangkok, by Design 103 Ltd



Key to level four

1. Prefunction
2. Convention hall
3. Loading dock
4. Main entrance below
5. Exhibition hall
6. Atrium link
7. Concourse
8. Existing convention centre
9. Lower exhibition hall
10. Grand Hyatt Hotel
11. New World Harbour View Hotel

Hong Kong Convention Centre extension by Skidmore, Owings & Merrill

It is rare that a convention centre becomes anything more than an unremarkable destination in a city. For Hong Kong, however, Skidmore Owings & Merrill (SOM) – in association with local architecture and engineering firm Won & Ouyang Ltd – designed a civic statement intended as a new symbol for the city as it enters a new era within the People's Republic of China, and as such hosted the 1997 handover ceremonies.

Looking somewhat like a gliding manta-ray, the 148,640-square-metre extension to the Hong Kong Convention & Exhibition Centre thrusts its wing-like roof into Victoria Harbour both figuratively and literally. More than 900,000 cubic metres of sandfill formed the 6.5 hectare man-made island on which the facility is built.

Transparency is another hallmark of the design, with circulation around the periphery and a glass-and-steel curtain wall affording views of the harbour. A 120-metre-long bridge, with access to all four levels, connects the extension with the older facility.

SOM believes that the organisation of the facility's spaces is typical for Asia,

John Gollings

Peter Bennetts

Above: The Melbourne Exhibition Centre, Denton Corker Marshall
Left: The Melbourne Convention Centre, John Andrews International

› AXS Satow Inc, and known colloquially as "Tokyo Big Sight". Two exhibition halls, comprising 80,000 square metres, offer as many as ten exhibition areas. These connect with the "Tower Building," resting on four massive pillars and capped by a four-gabled, pagoda-like roof, which has a variety of conference rooms. It cost US$ 1.89 billion and opened in April 1996.

Similarly, the Bangkok International Trade and Exhibition Centre, which opened in September 1997, boasts Asia's largest column-free exhibition hall, a 20,000-square-metre space covered by a suspended roof. "You could put four jumbo-jets in there," notes Sinee Amoradhat, senior vice president with Design 103 Ltd, the Bangkok-based firm that designed both BITEC and the earlier Queen Sirikit National Convention Centre. The new BITEC is cleanly hi-tech, without elaborate detailing, but the earlier Queen Sirikit National Convention Centre manifests a blend of hi-tech and traditional Thai architecture.

"The government owns the building, and they want visitors to see the Thai culture," says Amoradhat, "so that concept was applied". BITEC also has a 1,856-square-metre convention hall and a number of meeting rooms. Amoradhat says that BITEC, built privately by

Steinkamp/Ballogg

Facing page:
Glass circulation space is comparable to that of Foster's Valencia Congress Centre which was completed later
Left:
View from across Victoria Harbour

where tight footprints prescribe verticality. Hence, three exhibition halls are stacked on top of each other, with a 4,500-seat convention hall at the summit. The convention hall and top-level exhibition hall occupy an 80-metre-wide clear span space under a sweeping, curved ceiling 14 metres high.

Nonetheless, the metal-and-glass bands of the curved, layered facade help enforce a sense of the horizontal, striking a contrast with the largely vertical city behind it.

Also typical of Asian meeting facilities is the attention to multiple civic uses. Restaurants and shops are located on the ground level, and the interior spaces are designed not only for conventions and trade fairs but for local civic functions, too. "That's an innovation. There's nothing like it in the States," says Lary Oltmanns, who is based in SOM's Chicago office.

The original building opened in 1988 as Asia's first integrated convention and exhibition centre, and the extension more than doubles its size. The project marks the first instalment in a master plan calling for a new subway line, a new expressway, a ferry pier and a harbour promenade.

Pharinthorn Co Ltd, aimed to capture the growing market for international trade exhibitions, for which the government-built Queen Sirikit Centre was not suited. Previously, that segment of the industry had been both local and smaller. "The market was very healthy before the crisis," she notes.

Asian recession dampens demand

Now, however, the issue is doubtful, both for continued bookings at recently completed facilities, and for building new ones. "Right now, a number of projects that were on the burner have been set aside," says Christison.

But in some places, the business of meetings continues apace. The Singapore International Exhibition and Convention Centre, a US$550 million dollar project that opened at Suntec City in 1995, recorded brisk business in 1997, a 60 percent occupancy rate despite the currency crisis. Although some events have been cancelled, the facility hosted 124 exhibitions, three-quarters of them from abroad, SICEC reports.

And regional competitors have been both busy and building. Marketing reported that the Sydney Convention and Visitors Bureau won 34 major convention bids in 1997, with the considerable expansion of the Sydney Convention & Exhibition Centre nearly complete. Melbourne opened its new Exhibition Centre, with 30,000 square metres of clear-span exhibition space, in 1996, just across the Yarra River from the Melbourne Convention Centre. This year the two were joined in common management as the Melbourne Exhibition and Convention Centre. The Exhibition Centre was designed by Denton Corker Marshall and the Convention Centre is by John Andrews International.

Cautious optimism

In Asia, however, the prevailing attitude seems to mix patience with cautious optimism. Although economists train wary eyes on ›

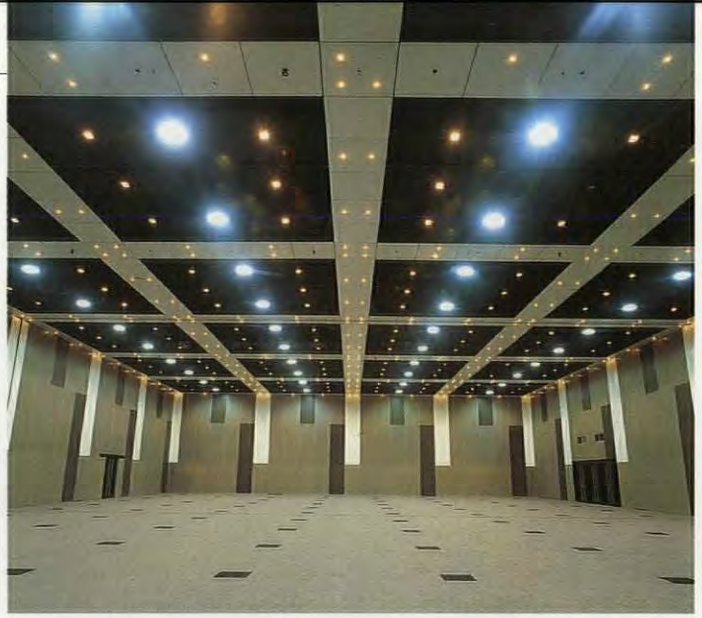
Christchurch Convention Centre, New Zealand by Architecture Warren & Mahoney

Although Architecture Warren & Mahoney's (AW&M) Christchurch Convention Centre was the first purpose-built convention centre in New Zealand, the building was not entirely without precedent; the Christchurch Town Hall is directly opposite and was designed by the same firm's founding partners 33 years ago. The two buildings are linked by an overpass bridge and seem to regard each other across the road with interest.

The brief for the convention centre was conceived by Christchurch City Council in conjunction with overseas consultants. Before the competition a budget of US$15 million was established, considerably less than the figure the council were advised they should spend on the building. Project design director Thom Craig offers his explanation as to why the AW&M entry was chosen: "Our winning design clearly provided a rationale that could deliver this complex facility for the given budget without compromising the building's aesthetic appearance and functionality within the existing open fabric."

It has been suggested that "the money is up front and peters out to the rear", but while it is certainly true that from the street-front the building has a lively presence, ostentatious it is not. Glass cladding clings to the steel frame set in front of the main concrete structure of the building, creating the foyer space and offering a glimpse of the goings-on inside. At night small lights sparkle from behind the glass, on the ceiling and from the floor, illuminating the imposing curved wall which sits behind the screen. Behind it there are three major conference spaces, and another seven smaller, versatile rooms which are interlinked by a central circulation area. Craig refers to "a hierarchy of spaces from the public foyer back past the convention halls to the rear-accessed storage and loading facilities".

The effect is crisp, elegant and modest, in line with Thom Craig's idea of how the building should relate to the town hall opposite. "Our design strategy is one where I have used the original modernist intensity of the town hall design (materials, separation of forms and spaces, circulation and constructivist detailing) within a 'filtered' reductivist process that has produced a minimalist palette in delivering the 'big idea'. The language of the Convention Centre reinterprets the Town Hall in a palette of concrete, steel and glass." When asked how AW&M approached the design of the first building of its type in New Zealand Craig says: "The assemblage of these materials has obvious international counterparts but the formal language and iconic layering of space and materials has a distinctive Pacific influence." The first convention centre in New Zealand is a successful blend of simplicity, solidity and elegance, built with limited means, which is appropriate for a pioneer nation. *KM*



Studio La Gonda courtesy of Architecture New Zealand

Above:
One of the three main conference spaces

Left:
A glass facade, common in almost all new convention centre design, enables the foyer to be visible from outside, and for conventioneers inside to orientate themselves. Here, the town hall across the road can be seen

Key to cross section of Christchurch Centre

1. Main entrance
2. Foyer
3. Exhibition spaces
4. Loading bays

Steinkamp/Ballogg

Model of the Korea World Trade Centre by Skidmore Owings & Merrill

› proven powerhouses such as Singapore, Hong Kong and Japan, waiting to see how weak exports and slow real estate sectors cope with regional setbacks, countries which predicated too much growth on real estate are those least likely to invest government funds in convention centres or expansions.

"It's a public investment which a lot of strapped governments are not going to be making," comments David Gladstone, who teaches at Columbia University and researches the economics of tourism. The lure is hard currency, given that conventions represent a kind of "export" for a country, but convention centres are expensive investments for governments in austerity programs, and they are import-intensive.

Public-private partnerships, particularly those that build convention facilities capable of supporting themselves as components of larger urban developments, might offer an answer. The Korea World Trade Centre, an SOM project under construction in Seoul, will anchor a superblock with a five-star hotel, a 40-storey office tower, low-rise offices and a below-grade restaurant and entertainment complex.

Built by the Korea International Trade Association, a private group spun from a government agency, the KWTC expects to be

Cost considerations *provided by Hanscomb*

Here are some of the factors that drive the costs of convention centres:

- It is not unusual for about 40 percent of the total construction costs to be taken up by the structure, including foundation, but excluding facades. This is where most of the money goes and where the greatest attention needs to be paid.

- Structural costs are driven by two main factors: spans and live loads. Andy McLean says that after much experimentation in the early days, his firm has settled on the optimum bay size of 27 metres by 27 metres as creating the best balance between the aggravation of columns and a sensible level of investment. Nearly all the recent US convention centres use this bay size, with a few exceptions. Live loads 1,830 kilogrammes per square metre over the entire exhibit area are now the norm.

- When we turn to double decking, the effect on cost of these live loads and bay sizes is multiplied significantly. It is not possible to use cost parameters from a single level centre to budget for a double decked approach.

- Double decking also requires double levels for loading docks and truck access that can create inordinate cost problems. The alternative of using heavy freight elevators rarely works financially or operationally.

- Net to gross floor area ratios for this building type are not good news and can frequently upset budgeting at early stages by the inexperienced. To the net area required for exhibition space, meeting spaces and ballroom, there will need to be added at least one hundred percent to cover circulation, services, etcetera in order to arrive at total built space.

- In Asia, the introduction of full scale lecture halls with sloped floors for teaching is very popular. These are beginning to creep into US and European facilities.

- Even though parking by itself is not a big cost factor in comparison with the centre, it is always a major issue, often more political than practical. It does not make much sense to place parking below exhibition and convention areas, nor above, so a place must be found for it elsewhere on site. As a result, parking often competes for footprint with the main building itself. More and more cities are realising that they need less parking than they thought, because surrounding commercial parking can be put to use, often at weekends and evenings.

- Roofs, for some reason, become a very attractive target to planning committees and the uninformed. All that white space on the drawing must be usable for something – why don't we put a hotel on top, or tennis courts, or landscape it, or even use if for open-air exhibition space? All very laudable ideas, but these create serious cost problems down below.

- Today it is a constant struggle to keep servicing costs under control in reaction to a series of trends taking place:
  - Increased power requirements noted above. The new expansion to the Los Angeles Convention Centre was designed to provide 430 watts per square metre whereas the original building provided 205 watts per square metre.
  - Nearly everyone is trying to comply with mandatory or voluntary energy codes that require balancing first versus long-term costs.
  - In the US new ASHRAE standards increase outside air requirements from 1.9 litres per sec) to 7 litres per sec per person, all of which needs to be heated and cooled.
  - Sound control requirements often inhibit the use of roof tops systems.
  - Greater lighting flexibility has been met by industry innovations, better and more flexible lighting sources and controls.

- The voice, data and video communication is having a big technology impact. Mike McCleskey of McCleskey Consulting says that "everybody is going nuts. The technology is moving so quickly that everyone is afraid to make an investment and when they do, they tend to buy the best". He says that Cat V cable, which provides 50 megabits bandwidth, can deliver everything presently needed, but everyone wants fibre optics, which has no limit on bandwidth, even though it is expensive. He is recommending installing a fibre optic backbone with Cat V branches which can eventually be replaced with fibre optics, once the technology and the software have caught up.

Overall, the convention centre is a challenging building type to budget and control.

***World Architecture* and Hanscomb Inc. wish to acknowledge assistance given by Andy McLean, of Thompson, Ventulett, Stainback & Associates, Atlanta, Georgia; Mike McCleskey of McCleskey Consulting, Calabasas, California; and Dan Graveline of The Georgia World Congress Centre, Atlanta, Georgia, in compiling this information.**

that rarest of beasts, the convention centre that pays for itself.

The project adds to an existing convention centre 20,000 square metres of exhibition space and an 80-metre wide, column-free convention/exhibition hall, along with new meeting rooms and restaurant facilities. SOM master-planned the entire complex to meld old and new seamlessly, and to mask the convention centre's loading docks with the hotel and office tower.

The project also typifies the determination of Asian planners to integrate meeting facilities into city life. "It's more of a social or civic kind of a facility, you see a lot of wedding banquets, business lunches, musical performances... It's a much more friendly and outward-looking building, and it tends to be used at night as well as during the day. So it's a wonderful contribution to the city," enthuses SOM's Oltmanns.

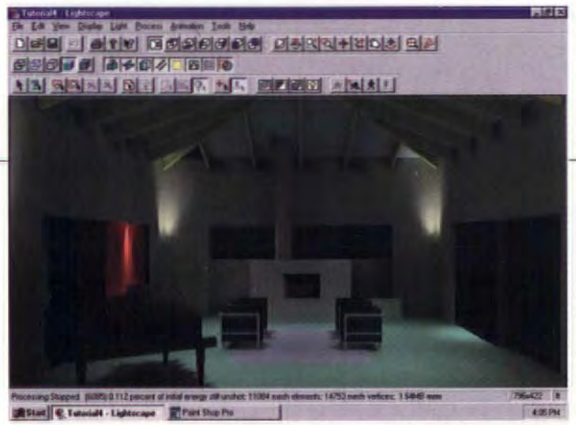
Both civic and corporate users of Asian meeting facilities look for a degree of elegance and "high-touch" design often lacking in North American convention centres. Until last year, when many Asian economies were booming, sumptuous convention centres were one way for the host city to give the rest of the world a view of its modernity and affluence. No one is likely to build anything like the "Tokyo Big Sight" in the near future. Also, Asian convention centres tend to serve doubly as community-orientated facilities, so there is a requirement to build something the local population will find appealing. Typical is the new Tokyo International Forum, (see *WA*61 page 30), the much publicised and critically acclaimed facility in the central Marunouchi business district, designed by American Rafael Viñoly. The forum features an expansive, sunny atrium accented by the suspended hull of an ancient Japanese sailing ship. Inside, the appointments are appropriately luxurious and highly automated.

CAD

ArchiCAD produces images that can gain clients' attention and then be used as a marketing tool

Embracing progress

For most architects and clients, CAD is no longer an option, it is a pre-requisite. In World Architecture*'s update on current developments in the CAD market, Richard Spöhrer reviews the latest products from AEC Systems '98 and talks to Yoav Etiel of Bentley Systems about the correlation between the design firms with the highest fee income, and those which most fully exploit technology.*



Lightscape by Discreet Logic, a stunning radiosity rendering package

3D modelling with Graphisoft's ArchiCAD

The correlation between increased performance of hardware and its reduction in cost is well documented and is a continuing trend in design technology. This has led to a dramatic increase in the functionality of design software as developers exploit the capabilities of new low cost desktop computers. Another important factor in the development of easy-to-use design tools is the growth in the potential market provided by the widespread adoption of computers for common office tasks. Any PC you buy today has the ability to run highly complex CAD and visualisation applications.

Volume sales of design software will never match those of "office" applications but the volume directly relates to cost. A comment from a senior AutoDesk staff member relating to the cost of AutoCAD speaks volumes about the industry. When asked how the high price of design software can be justified he commented: "If we sold AutoCAD for US$499 how many more copies would we sell? The people who need our solutions are happy to pay for them. Cheaper solutions are available from other vendors but their margins would not support our business."

This is a typical attitude to the market. Microsoft has revolutionised the desktop with the advent of Windows but even Microsoft recognises the need to fully exploit a market. Windows '98 is clearly aimed at the "home" market and priced accordingly, NT on the other hand provides a much more robust and manageable working environment, and this is reflected in its cost. Like CAD vendors Microsoft recognised the need to maximise margins on lower volume products, which invariably require greater levels of R&D and technical support.

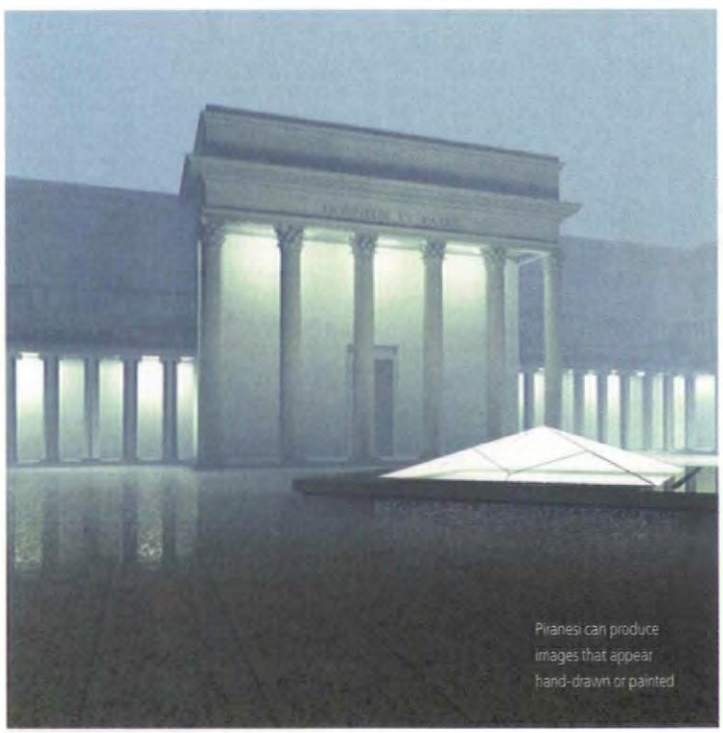
While Windows is by no means the most stable or easy to use operating system available it has won the battle along with the Intel based PCs on which it runs. How designers exploit the potential of this technology over the coming years will be one of the key factors in the success or failure of any design business. Clients are now surrounded by highly sophisticated visual information and their level of expectation has been greatly increased. Gone are the days when you could present your multi-million dollar project using a few sketches on a restaurant table cloth or napkin. Recent research has shown a direct relationship between the architectural firms with the highest fee income and those who most fully exploit technology. This is not only a measure of their ability to execute projects more efficiently but also reflects their ability to win large projects.

"Design technology will not make you a good designer, but it will allow you to focus your efforts on your destination and not get caught up in the journey."

Design technology will not make you a good designer, although it might make you a better one, but it will do is allow you to focus your efforts on your destination and not get caught up in the journey.

Technology in its widest sense is also affecting architecture in many more subtle ways. Daniela Bertol in her book *Designing Digital Space* raises a number points relating to the future of the profession. She states: "We have witnessed how major changes have been undertaken by the architectural profession not only at the design stage, but also in its delivered artefacts. A series of questions arise about a possible shift in the task of architecture. Will the new media affect not only the design but also the final built environment?"

While this argument for the design and population of cyberspace by architects is gaining ground it is yet to take hold of the profession. The advent of the intelligent building and the need to visualise, however, will put ever increasing pressure on the profession to grab the technology bull by the horns.



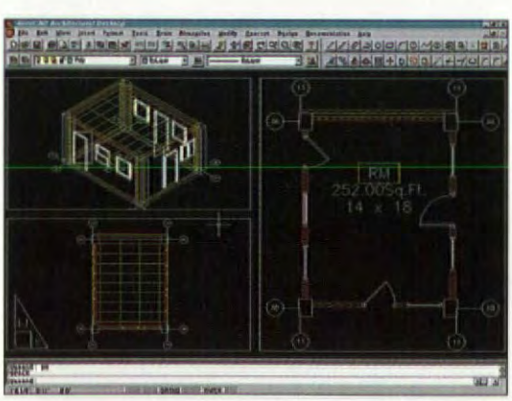
Piranesi can produce images that appear hand-drawn or painted

ArchiCAD from Graphisoft – makes extensive use of "drag and drop"

AEC Systems

Architectural Desktop from Autodesk – an out-of-the box package based on the AutoCAD engine

This year has seen a number of major software upgrades. All the major CAD applications have been, or are about to be, updated and the decision making process for architects is harder than ever. AEC Systems, held in Chicago in June this year, saw all the major vendors vying for the attention of the delegates. Investment and visualisation were the buzz words.



Architectural Desktop provides a suite of object-based arcitectural tools for 3D design

The spotlight this year was on the use of visualisation and its effect on the design process. Also keenly debated was the return on investment that can be expected from the implementation of design technology. Bruce Jenkins, a leading industry analyst from Daratech discussed research undertaken showing that the actual cost of a CAD seat is not really affected by the cost of the software you use. The cost of a software licence represents around 14 percent of the total with the remainder made up of hardware, personnel costs and infrastructure costs. This raises interesting questions, as the focus of CAD implementation tends to be on the cost of the software rather than the other factors.

The release of **IntelliCAD** from Visio, with its claimed 100 percent compatibility with AutoCAD's DWG drawing format, brings this to the fore. AutoDesk has also been busy with three major new products on show. The first, **Actrix**, is a new addition to the Personal Solutions portfolio. The Personal Solutions group was set up in 1997 to market more consumer-based products like the recently upgraded AutoSketch. Actrix is a new technical diagramming application that features intelligent shape technology, industry expert symbol libraries and AutoCAD interoperability. Users can quickly create engineering schematics, facilities plans and business diagrams through the drag-and-drop of interactive shapes that can align themselves to underlying AutoCAD geometry.

After its introduction at The American Institute of Architects Show earlier this year, Chicago also saw the first major public showing of Autodesk's new offering for architects, **Architectural Desktop**. Like Mechanical Desktop in the engineering arena, Architectural Desktop is an integrated AutoCAD R14 solution specifically developed to support the architectural design process. Architectural Desktop uses object-oriented technology to give users a set of model-based design tools that utilise intelligent objects to make the design process far more efficient. The software developed over two years focuses on the entire architectural design process, giving architects using AutoCAD a

BRICSView offers over 150 materials and 3D elements for detailing both interior and exterior features

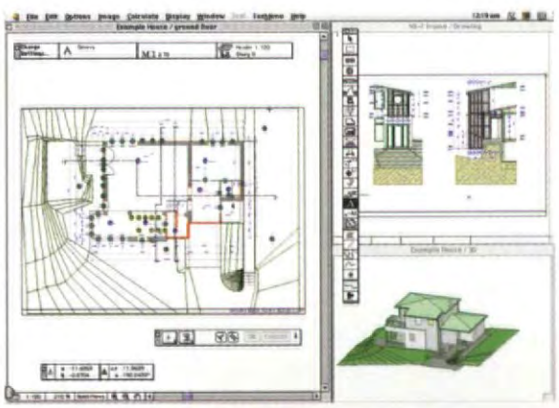
working environment more suitable to their working methods. As well as drafting tools Architectural Desktop provides management and automation functions that enable designers to maintain data integrity throughout the design process. Many time-intensive tasks such as the creation and editing of preliminary sketches, and developing easy 3D conceptual design models and massing studies have been automated as much as possible. Intelligent objects are provided allowing walls, stairs, roofs and elements such as door and windows to be placed and their geometry automatically adjusted. Tools for annotating, dimensioning and detailing construction documents have also been added.

BRICS, the original developers of Triforma, has released a number of new products including "add-on" applications for Triforma. **BRICSView** aids the creation of realistic presentations of your building model offering over 150 materials and 3D elements for detailing both interior and exterior features. From plants and trees, which can be rendered in any season you require, to elements such as playground swings, the collection is comprehensive. A 2D model has also been developed to allow area calculations and enhance the presentation of plans, elevations and sections. BRICS 2D automates the production of 2D drawings from the building model allowing them to be updated automatically as the design develops.

IntelliCAD from Visio – 100 percent compatible with AutoCAD

Visio announced the purchase of the CAD technology of Ketiv Technologies. Ketiv is best known for its **ArchT** software application which runs on top of AutoCAD. ArchT provides AEC-specific functionality, such as 2-D production drafting utilities, styles-based design features and customisable records and reports. It also provides dynamic block and layer control as well as 3D design and visualisation. ArchT runs on IntelliCAD and will be developed simultaneously for the AutoCAD and IntelliCAD engines for its next release, providing architects and designers with a consistent feature set and user interface across platforms. "AEC is a very important market for Visio," said John Forbes, vice-president of technical products at Visio. "Our acquisition of the Ketiv product line will ensure that AEC users continue to have the option of standardising on a state-of-the-art AEC design solution that is available for more than just one CAD platform."

Archicad is excellent for the production of interactive visualisation material



Graphisoft, developers of **ArchiCAD**, announced the release of version 6.0. The most comprehensive upgrade to ArchiCAD since its launch in 1984, new features include direct 3D editing, database links, an open API and a multitude of 2D drafting tools. ArchiCAD has always been a 3D object based drafting environment and release 6.0 sees Graphisoft react to feedback from its 45,000-strong user base. One of the most visible improvements in version 6.0 is the ability to create, edit and navigate directly in the 3D window. Working in perspective view is manageable even within complex models. Gravity has been introduced into the design process allowing elements to be drawn in the correct x/y position, which will "drop" to the working plane or object surface over which they are placed. The introduction of a Mesh tool allows far more organic structures to be created, making terrain modelling much easier.

Standalone visualisation applications like 3D Studio Viz are becoming more popular

TeamWork, the network enabled version of ArchiCAD introduced last year, has also been upgraded. TeamWork 6.0 now supports the SVF format via a free Netscape or Explorer plug-in. Drawings can be changed on-the-fly allowing even greater levels of interactive working. ArchiCAD 6.0 can now work with AutoCAD R14 drawings, preserving Xref file information within the ArchiCAD file for re-export at any later time. Along with this element unique to ArchiCAD, files can be held within exported DWG files to be re-introduced when the files are read back in.

World Architecture *speaks to Yoav Etiel, Bentley Systems' Senior Vice-President of Marketing, about investment in 3D modelling, rebuilding Microstation/J around Java and tailoring single IT solutions to serve every team member in a major project.*

Bentley's model for the future

While other vendors in the market are still providing desktop solutions, Bentley is engaging what you term "the enterprise". How do you define the enterprise in relation to the construction industry?

There's no better industry to illustrate the entity referred to as an enterprise than Architecture/ Engineering/Construction (AEC). AEC projects are often large, they are designed to last a long time, and they require a lot of diverse expertise. No one company, and certainly no one individual, can design, build and maintain these projects alone. It is thus the norm rather than the exception that firms form an enterprise to tackle the task together. These enterprises can cross departmental, company, discipline, geographical and time-zone boundaries. It is not unusual for two members of an enterprise to join forces to accomplish one project, and then to compete against each other on the next. As projects get larger and more complex, and with more members involved in more remote locations, the trend toward enterprise configurations is on the rise.

"There is a correlation between firms that are considered the world's most successful and firms in which the world's best practices in applying engineering IT can be found."

The cost of adopting technology solutions within design firms is often cited as a reason many are hesitant to adopt these ideas. What would you say to a firm which says, "we just can't afford this solution?"

The cost of not taking advantage of new technology, especially the kind of software technology we are talking about, has long surpassed the cost of implementing it. Leading architects and engineering organisations realise that. In fact, I am convinced that there is perfect correlation between the firms that are considered the world's most successful architectural or engineering organisations and the firms in which the world's best practices in applying engineering IT can be found.

The question is thus not whether or not to use software technology, but how do you lead the race in competitively applying software, and specifically IT, for business benefits.

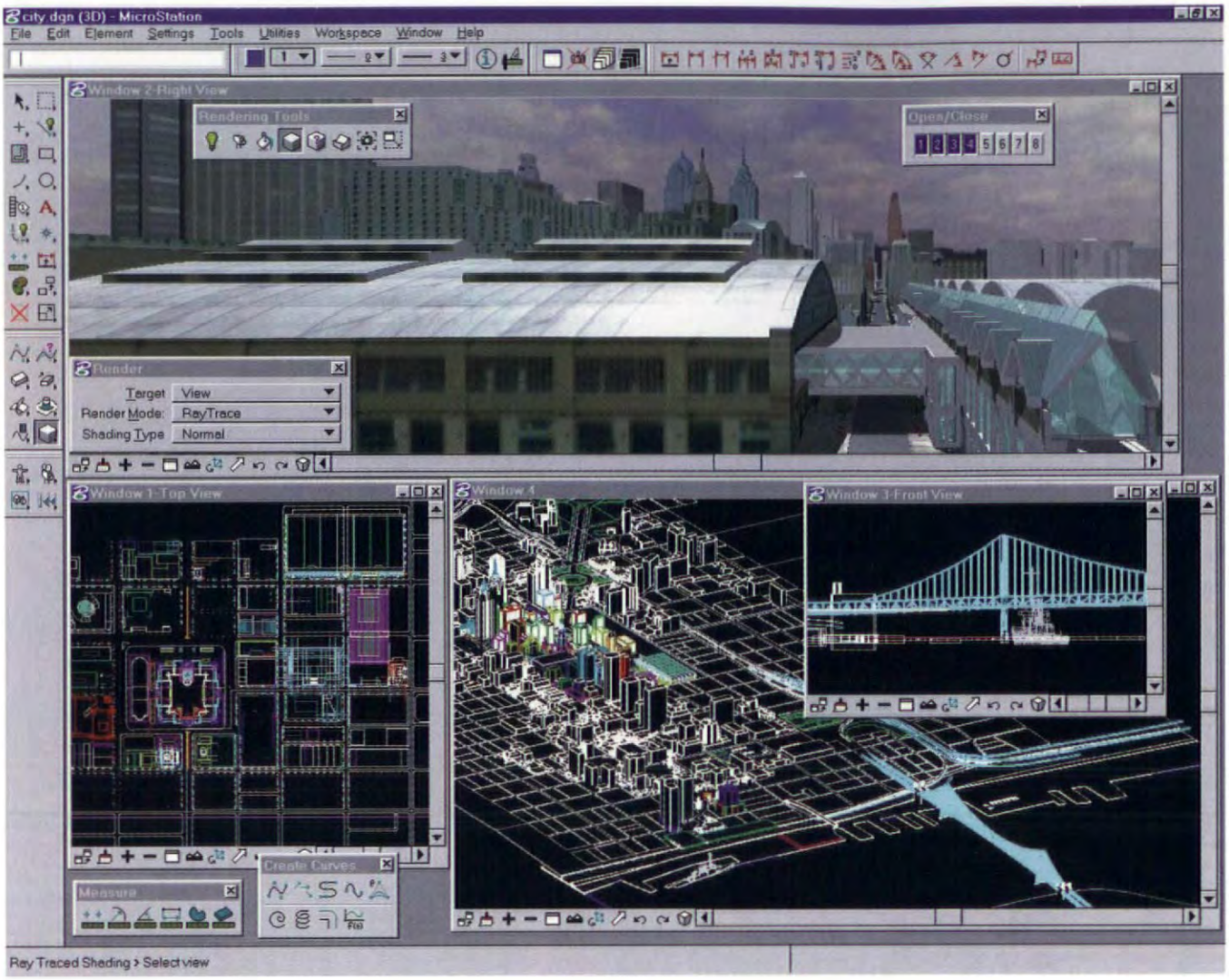
The industry has accepted 2D design solutions and is now beginning to embrace 3D. The idea of the building model seems central to your plans. How is Bentley forwarding these principles?

In order to realise the next big leap in productivity, we must shift the architect's and engineer's focus from an electronic drawing to the digital, single building model. At Bentley, we are moving toward engineering modelling across the board. MicroStation TriForma users, for example, are able to create single building models today without any limitation on how many smaller components, sometimes stored in separate files, make them up. And with MicroStation /J, this model can encapsulate relationships and behaviours of the project components.

The next major release of MicroStation is built around Java as the programming core. This is a radical, and some would say risky move. What is the reasoning behind this major change?

In a very short period of time, Java has become the enterprise's favourite development environment. This is not surprising - Java brings the benefits of components to any computing device, large or small, as well as to any application, whether it is thick (engineering software) or thin (web browsers).

Since Java provides for a consistent GUI in both thick and thin clients, it saves training costs, along with the cost of documentation. It reduces cost of software maintenance and installation thanks to auto-install and auto-update features,



Microstation/J from Bentley Systems, now built around a JAVA programming core

and it provides application-level interoperability with enterprise IT. In short, Java is the right option that arrived at the right time-just when organisations have shifted their focus to enterprise - wide collaboration and project life-cycles. From both a technical and business standpoint, supporting Java has been a major investment for us, but it is not a radical or risky investment. Java does not limit our options; rather, it expands them. Java builds on what we have been using (C and C++), so that there was always a "safety net". Plus, there are literally hundreds of thousands of developers around us who have taken the same direction. Finally we did not rewrite MicroStation in Java. Part of our development team's innovation was to "simply" develop a programmability layer

"As important as recruiting excellent talent are the tools this talent is handed."

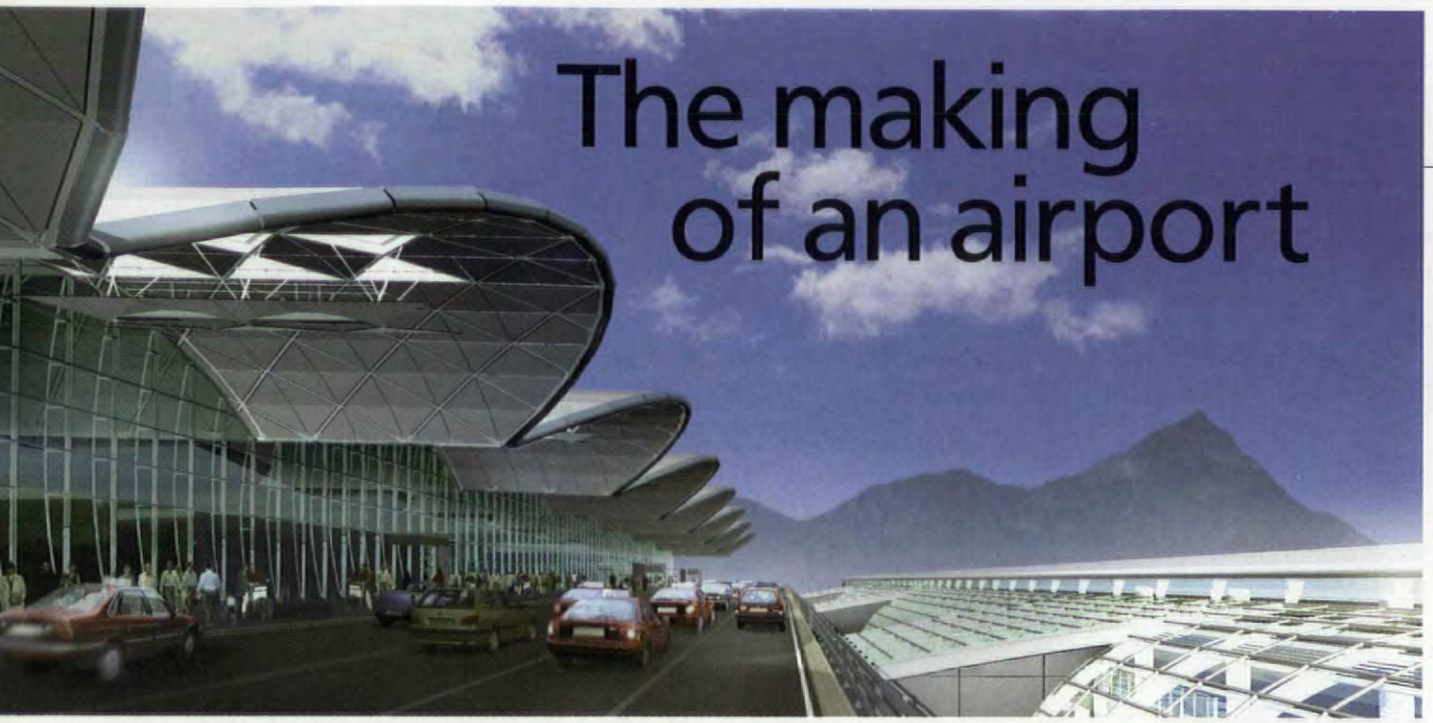
so that enterprise applications can now run within MicroStation and new ones can be written in Java. So our developers did not subject us to the same risks incurred by those who tried to completely rewrite their software in Java.

Finally, what are going to be the major changes in the industry over the next two years, and what part do you think design technology will play in these changes?

In my mind, the fundamentals are very clear. First, we are moving from a world of war to a world of peace. Projects such as Lebanon's US$50 billion investment to reconstruct itself in the next five years, or even the US$203 billion infrastructure bill that Bill Clinton signed in June, are all related to this new shift toward rebuilding rather than destroying what exists.

Infrastructure is red hot, and infrastructure projects drive much of our users' businesses. With so much business to win, technology must help win, deliver and support such projects. There is also a lot to lose: With economic borders literally wide open virtually all over the world, architects and engineers are going to either compete or team with global organisations on these projects, while at the same time seeking projects in remote locations in order to fuel their own growth. Global in nature, tomorrow's projects will be larger either in scope or level of complexity than the projects of the past. They will be delivered by teams that are larger by either the number of individuals or the number of business entities involved. The more educated client's expectations are going to be higher. And they are going to demand that the building model be delivered along with the keys to the front door. We already see this across the board with operational engineered facilities such as industrial plants, airports, etc. These trends are all crystal clear to me. The obvious remaining question is who will exploit these trends and become tomorrow's leaders? As important as recruiting excellent talent are the tools this talent is handed. I am convinced that the answer is those who apply IT competitively today.

The making of an airport



With Microstation at the core of the visualisation technology, everything down to the smallest detail was rendered with over 100,000 models

Case study: Bentley Systems, Microstation

This summer's opening of the Hong Kong International Airport saw the completion of the largest engineering project the world has ever seen. This massive undertaking involving the construction of a new island would simply not have happened without the use of a fully integrated technological solution. In discussion with John Park, Hong Kong Airport Authority Design Product Manager, and Iain Godwin, IT director of Foster and Partners, this soon became clear.

The 515,000-square-metre terminal building is 1.3 kilometres long, fitted with 50 gates and more than 130 retail units, and a capacity to shift 35 million passengers per year. One hundred thousand passengers per day, or the population of a small city, have to be moved through the building. It was realised that from the beginning of the design phase in 1992 that the project's massive scale and staggering complexity called for new solutions and creative planning. As well as the construction difficulties the most pressing problem the Airport Authority faced was the question of communication. More than 20 design contractors and more than 40 construction contractors worked on the project. The enterprise's participants were stretched from the US, the UK to Hong Kong to Australia. At the peak of construction, there were more than 20,000 workers on site. The risk of crossed signals and lost information was a serious one. With all of these unique factors at play, the Hong Kong Airport Authority made a decision right from the start that Bentley's MicroStation would serve as the "foundation" engineering software for the airport.

Over 100,000 2D and 3D models were produced during design and construction of the airport. This rose to over one million in Park's estimate when revisions and alterations were considered. To make matters worse redesigns and reissues of models continued well into the construction phase as they do with any major project. The design team, led by Sir Norman Foster, quickly grew to over 120 people. The use of MicroStation and the Internet averted what could have been "chaos" according to Park. The standardisation of models, and the introduction of a robust procedure for tracking, moving and sharing them amongst the team over time and space allowed the whole system to work. The Internet was used to get information from the designers to the Airport Authority and from there on to the construction teams. An Oracle database was used to log and automatically distribute each model, as well as any other necessary engineering and architectural data.

Iain Godwin described the seed of the design as "a desire to create an indelible symbol of Hong Kong's new beginning as a gateway to China." He went on to stress that the architects credit the software with helping them achieve a revolutionary architecture that would not have been possible otherwise. John Park agreed saying that, "it would simply have been too hard to draw or visualise the terminal's roof without using 3D engineering software." Godwin also discussed Foster's interest in using lighting and "maximum transparency" in the terminal's design to create a calmer atmosphere than is usually found in airports. He explained that this design would also take advantage of the airport's breathtaking surroundings, and provide travellers with the most user-friendly layout. MicroStation was brought in from the conceptual stage, producing 2D information and 3D models, and was critical in helping the architects "see where space and solid came together." Godwin's conclusion was very forthright, "It is impossible to consider the development of the terminal without the technology."

Case study: Autodesk, 3D StudioMAX

Visualisation breaks down barriers

The use of visualisation in construction is still in its infancy, but an exciting project recently carried out in the USA shows just how effective it can be. The Golden Gate Bridge is perhaps one of America's most famous structures. At the end of 1997 a proposal was put forward for a new barrier to prevent head-on collisions between cars crossing the bridge. Although the safety benefits were clear to see, it became apparent that the project would impact on the existing architecture of this landmark structure, which is situated in a national park.

In order to communicate this delicate and important planning problem to both the local residents and authorities, the Highway and Transportation Authority asked Autodesk to create a visualisation of the bridge incorporating the new proposals. The idea was to give Bay Area residents and the District's Board of Directors a realistic impression of what it would be like to drive over the modified span in the lanes adjacent to the barrier.

A prototype of the barrier was specially designed by engineers Barrier Systems Inc using AutoCAD LT. To fit the narrow lane constraints of the Golden Gate Bridge, it had to be only one foot wide to leave the maximum lane clearance possible on both sides. The new Narrow Quickchange barrier met this criteria, but planners needed to study the aesthetic implications closely. Animators from Autodesk took the drawings for the barrier and used 3D StudioMAX software to convert the CAD drawings into a realistic model of the bridge with the barrier in place.

Merv Giacomini, District Engineer says, "I wanted to assist our Board members and the public in imagining what this barrier would look like and how it would affect the lane widths. We approached Autodesk because of its leadership and expertise in design, and the resulting animation has been extremely helpful." Dave Crespo of Barrier Systems Inc reports that lane

width is a common problem for bridge barrier designers, and that an easily accessible way of showing how their new barrier would maximise available space was essential to getting it accepted.

Giacomini presented the computer-generated animation video first to the District's Building and Operating Committee and then to the District Board of Directors in December 1997. In June 1998 the board voted unanimously to give conceptual approval to the project. Research is now underway into the environmental effects of the construction process in this architecturally sensitive area, but it is now likely that the barrier will get final approval in 18 months time.

With increasing pressure internationally from local communities to get involved with major planning decisions, the provision of visualisation material makes it easy for non-professional viewers to contextualise what they are seeing, by combining a greater number of dimensions in one package than any other medium could. Allowing prospective users of any design, be it a building or engineering project to immerse themselves prior to any work taking place can resolve many potential objections before they become problematic issues. The environmental impact of proposals can be clearly demonstrated and understood. As with many areas of human activity participation in the process is often the best way to avoid conflict and with design this is clearly true. WA

Above: Autodesk's animation simulated driving over the bridge with the barrier in place
Left: Seeing the 3D model from other angles allowed the viewer to assess the aesthetic impact on the architecture of the bridge

Editorial by
David A. Rozansky and **Becky Stevens**

Built to Last

DataCAD® streamlines worldwide design of facilities for the LDS Church

Could your firm design and manage a global network of facilities for a growing community of 10 million people? How would you balance multi-cultural design with consistency throughout the organization? What tools would you need?

Exterior
Monticello Utah Tem

The Church of Jesus Christ of Latter-day Saints, otherwise known as the LDS Church (headquartered in Salt Lake City, Utah USA), is a large, international organization that meets this challenge successfully every day. The LDS Church builds and maintains buildings in many countries, ranging from worship facilities to welfare centers, education facilities, visitors centers, museums, and libraries. The LDS Church is not only the design firm, it's also the project manager, general contractor, facilities manager, and client.

The LDS Church's Architectural & Engineering (A&E) Services division has the resources of a full-service architecture, engineering, and interior design firm with a staff of 78, including architects, engineers, interior designers and specifiers. When designing a building, (be it in Boston or Brazil), A&E Services must balance aesthetic, cultural and climactic concerns with the need for program consistency, while keeping control of design and maintenance costs. A key factor in helping the LDS Church efficiently meet these challenges is their unique deployment of CADD technology to solve virtually every tangible design problem, from the conceptual design phase through a building's lifecycle. With one program, A&E Services can contain design, construction and maintenance costs, build a database last the life of a building, and standardize plans for a full network of diverse buildings. That program is DataCAD from DATACAD LLC, Avon, Connecticut, USA.

This 'CADD efficiency' is exemplified in a new 21,000-seat auditorium that the LDS Church is building at its corporate headquarters. The new auditorium, which will be the largest of its kin in the world, will be host to the world General Conferences of the LDS Church. The new auditorium is the largest construction project built b the Church to date and will become a central landmark for the city an the Church.

"The auditorium project demonstrates the efficiency and improved communication that the use of one CADD system can accomplish," explains Kerry Nielsen, the project architect for the auditorium and a design architect for A&E Services. "This project required a lot of initial study, coordination, and communication between Church leadership, building users, the A&E Services team, and consultants. DataCAD wa our 'work horse' and visual communication tool on this project.

We used it for everything from feasibility studies to schematic design and rendered building-concept presentations for leadership, users and zoning boards. Off-site development studies, parking, access, circulation, tunnel development and coordination to Temple Square infrastructure have been designed with DataCAD. We've even modeled the city blocks all around the auditorium site.

"One of the goals of using one CADD system is that all of this information can be leveraged for facilities management and building maintenance, and to reduce work and costs on future buildings," says Nielsen. "We use DataCAD to examine different building options and costs. For example, there is the cost of construction, the cost of putting the building on-line, and operational cost. The total project cost includes the costs of land acquisition, architecture, engineering, and site development."

The information contained in the DataCAD files can be extensive. Every system and component required to build and maintain a structure throughout its lifecycle, including vendor information for every single replacement part down to the screws, can be included. This information is used by the facilities management teams in the field as a graphical database of the buildings they maintain and operate. Nielsen says that maintenance of a building over the course of its lifetime can exceed the cost of construction, and keeping these costs contained through standardization is imperative.

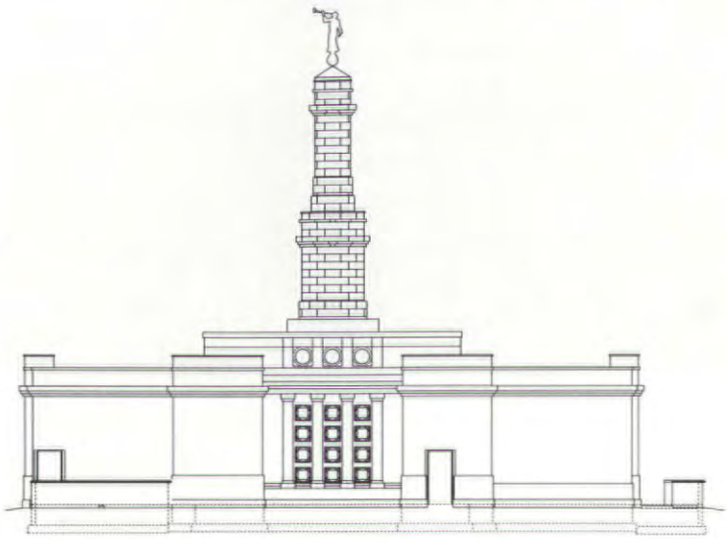
Project managers, audio engineers, and facilities maintenance staff also use the system. "We make broad use of this tool," Nielsen said. "Beyond the traditional architecture/engineering/construction design-document side of our work, DataCAD is used to design proprietary equipment, and the machine shop and the carpenter shop use DataCAD drawings to produce in-house parts and furniture."

One of the most important uses for CADD in A&E Services is to establish consistency and uniform quality in all of the LDS Church's facilities worldwide. Different climates call for different building designs that still convey a consistent quality and reverence in the details. Some of these buildings are in developing countries, where use of technology isn't as widespread. Complicating the process further is the fact that work must be conducted in many languages, and that the plans are used by a variety of contractors, managers, and even lay church members in the field.

The A&E Services division is solving these problems by developing an extensive library of standard CAD drawings which utilize architectural standards, symbols, and components as well as some concepts that are a common thread throughout the buildings. There is a standard design for each type of building. "We start with the standard drawing, and then customize the drawing with appropriate architectural details, flexibly working in whatever combination of measurement and languages is needed," explains Nielsen. "One of the reasons we chose DataCAD was the fact that it offered the robust CAD tools we needed, and at the same time was easy to use and adaptable to a variety of languages. The program's ability to quickly transform symbols and standards within a document to account for local needs has been instrumental in A&E Service's ability to meet its mandate.

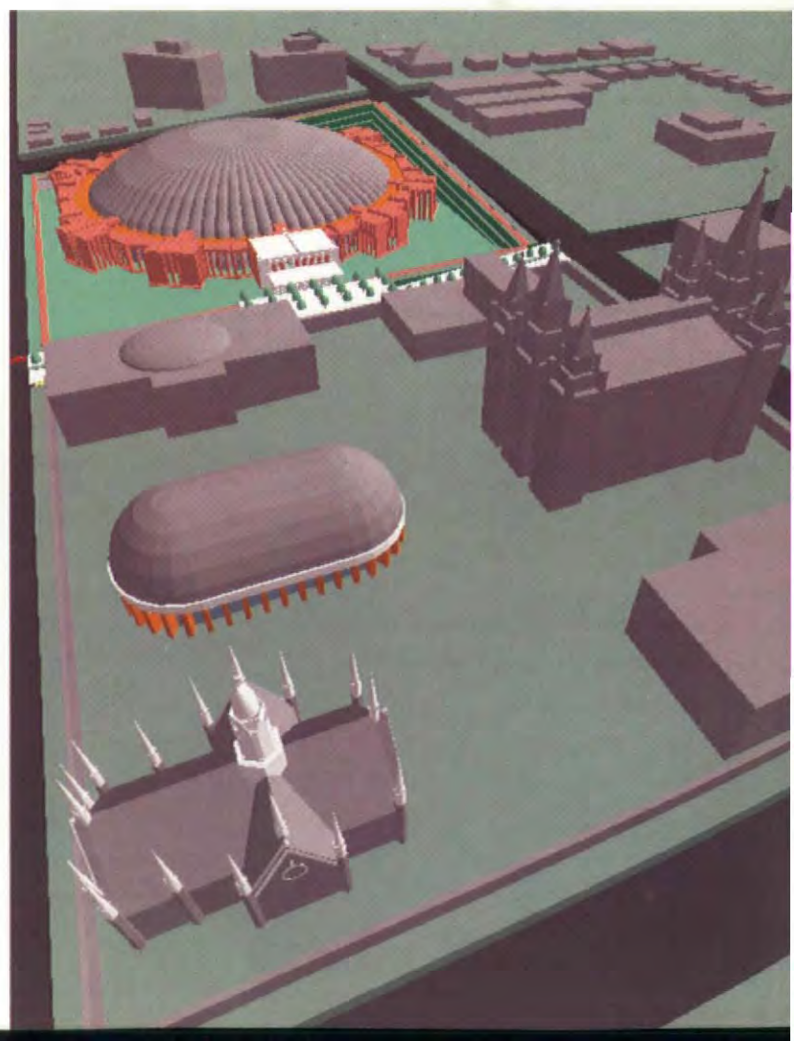
"This standardization has been particularly important for designing the LDS Church's most important projects–temples," continues Nielsen. "These facilities require a subtle architecture that establishes a sense of increasing reverence as a person moves from one station of the building to another. The DataCAD files of standard plans help the Church maintain a sense of consistency with this type of application, from one temple to another."

Nielsen says, "DataCAD is a very capable yet easy-to-learn tool. From an architectural standpoint, it allows you to study and evaluate options very quickly, without having to spend a lot of time and money to do it. It's a great tool for architecture."

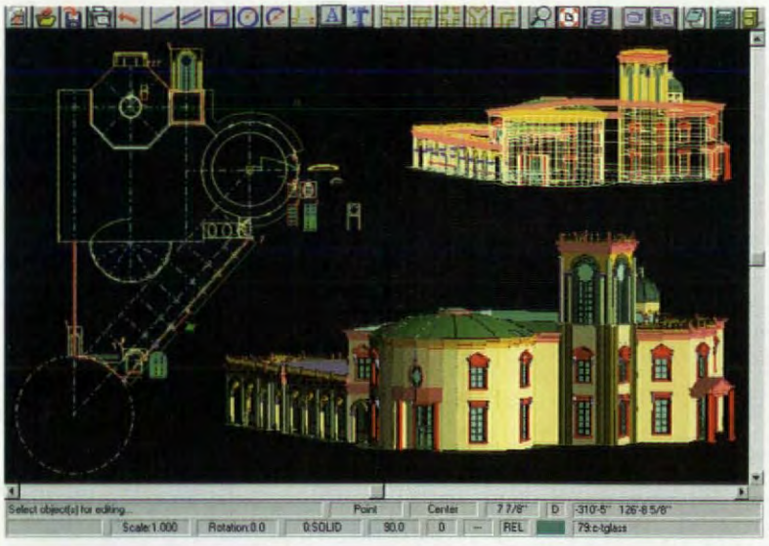


North Elevation
Monticello Utah Temple

New Auditorium
Salt Lake City, Utah



DataCAD architectural software provides high-end capabilities for architects and other design professionals. DataCAD is distributed to more than 80 countries. For the name of the dealer nearest you, please access the "Support" section of DATACAD LLC's web site at http://www.datacad.com, send e-mail to info@datacad.com, call DATACAD LLC at +1 (860) 677-4004, fax +1 (860) 677-2610 or write to DATACAD LLC, 20 Tower Lane, Avon, Connecticut 06001, USA. DataCAD is a registered trademark of DATACAD LLC.



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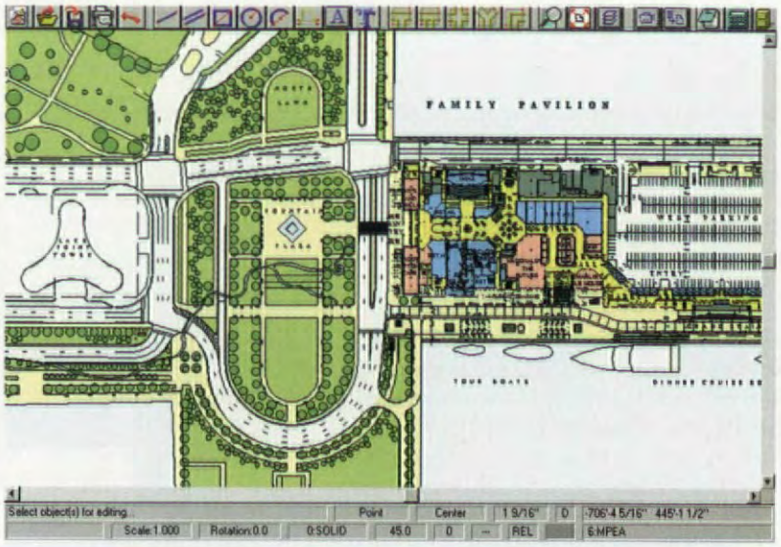

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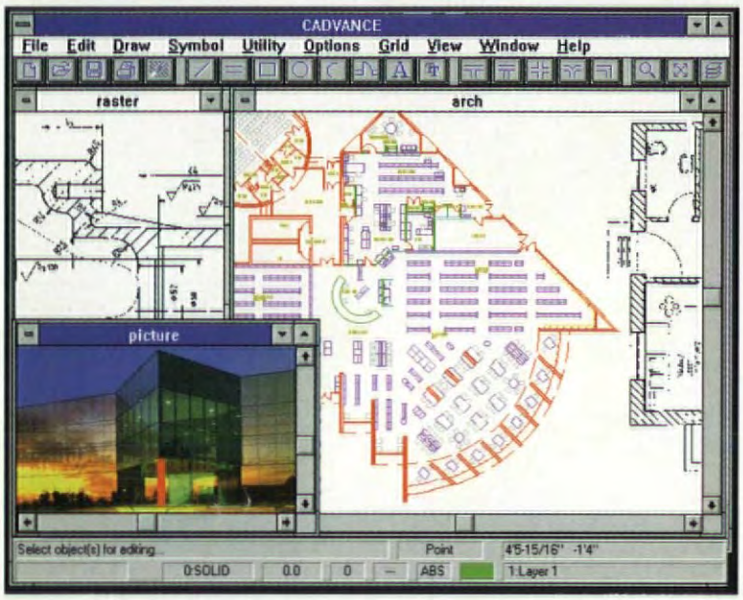

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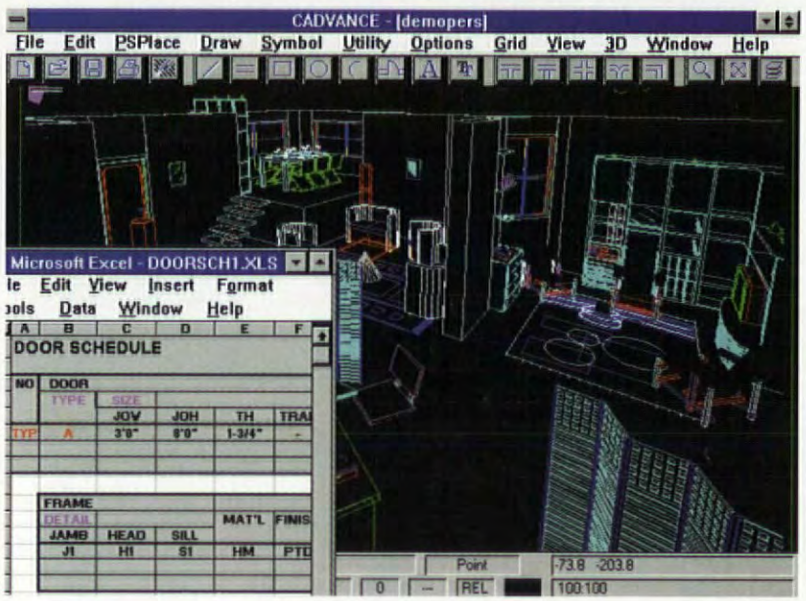

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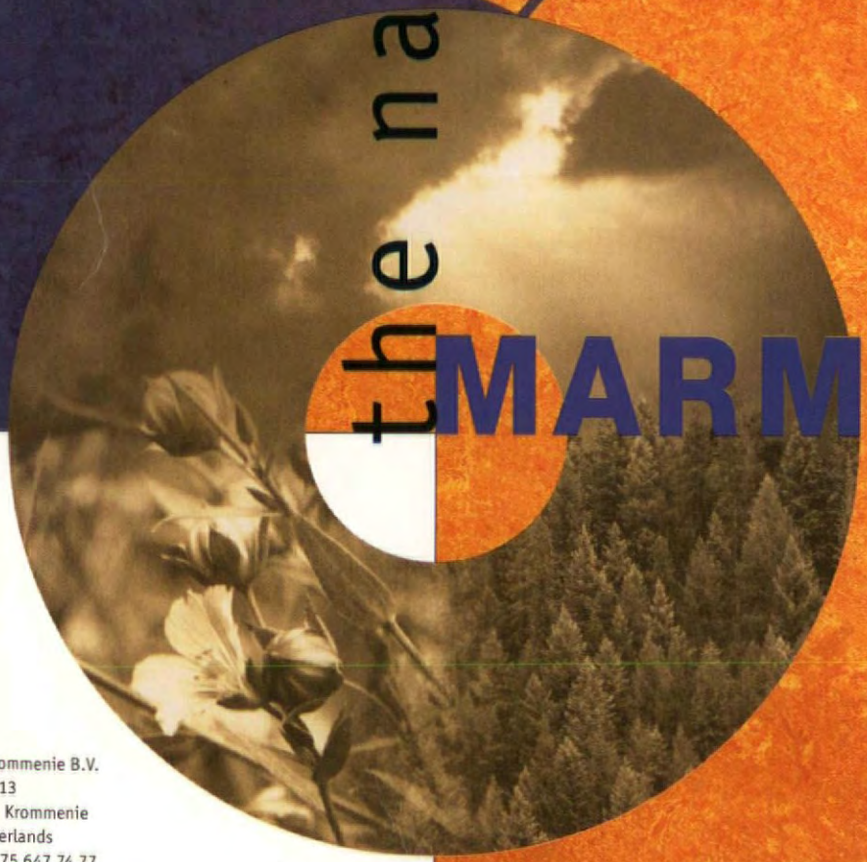

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