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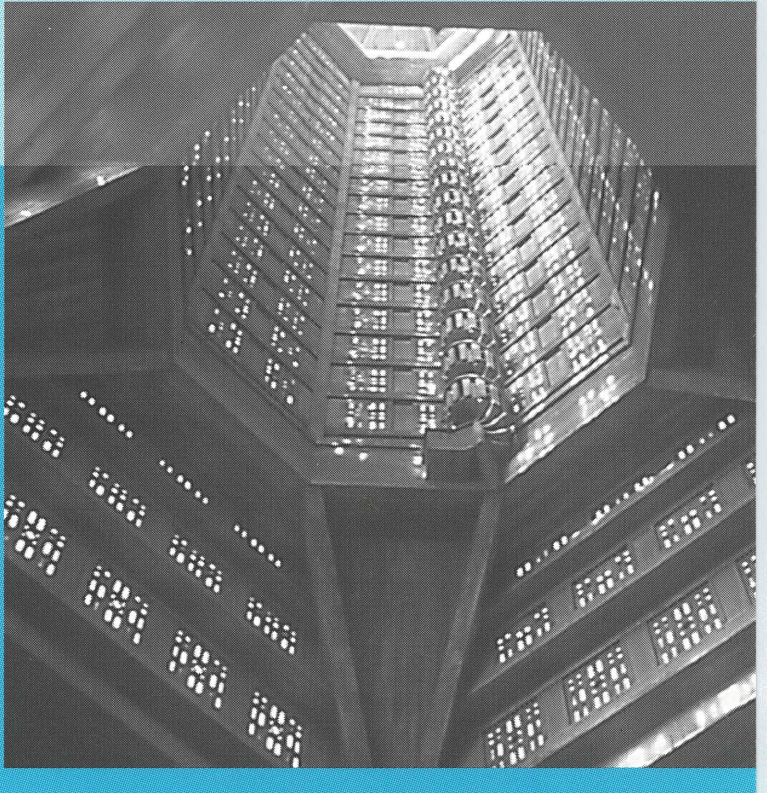
international working party for
documentation and conservation
of buidings, sites and neighbourhoods of the
modern movement

Journal 17

Exposed Concrete



September 1997

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The girl from Chadwick's 'Wow! Concrete!' cartoon (p. 33) admires the exceptional beauty of the La Boca springtower in Buenos Aires, a design by the Argentine master engineer J.L. Delpini (p. 34-38). Original photo: courtesy J.M. Cardoni. Cover: Perret's St. Joseph church at le Havre (W. de Jonge).

Colophon

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In the 1920s and 30s the Modern Movement was an important international architectural development. The cultural, economic and technical results of this movement are still noticeable today. Characteristic of this movement is among others that buildings were designed with a relatively short functional as well as technical life expectancy in mind. Therefore most of these buildings are in a bad condition at present, or they have been altered, sometimes beyond recognition. Due to their social and cultural value it is important to safeguard some of these for the future, in one or another way.

***The International Working party for the Documentation and Conservation of buildings, sites and neighbourhoods of the Modern Movement DOCOMOMO** was initiated in 1988 by the University of Technology in Eindhoven, the Netherlands, further to a research project on how the preservation of these buildings can be obtained in a coherent and effective way. The foundation of the Working party is meant to advance an effective inventory, documentation and preservation of the most important Modern Movement buildings, sites and neighbourhoods of that period. The aim of the Working party is to sustain a network for exchange of experience and know–how and to draw the attention of the general public to the significance of this part of the cultural heritage.*

The initiative is directed to:
- *those who are involved in policy–making (legislation, financing, management),*
- *those who are professionally interested in the protection of early modern buildings, sites and neighbourhoods (preservation officers, architects, urban designers, art historians, critics) and*
- *those who are responsible for their actual restoration (researchers, technical specialists, consultants).*

Contents

Special edition on the preservation of exposed concrete

The introduction of reinforced concrete dates mostly from the 19th Century when this modern material was used for utilitarian structures or was largely concealed behind traditional materials. It was not until the 1920s that architects and designers became involved in the design opportunities and expression of the *Miracle Material* itself, as is illustrated by Ola Wedebrunn in his introductory essay. The use of concrete was initially limited to structural applications, and the works of the Argentine *Maestro* Delpini show some of the most breathtaking products of modern master-engineering. Later, the material found a wider use, particularly after World War II, in panels and cladding. Because many modern buildings have become of age they are being re-evaluated to determine their significance as works of architecture. With the appreciation of these buildings on the rise the need for appropriate remediation and conservation techniques has become critical. While the processes of failure, distress or deterioration of concrete caused by poor construction techniques, inadequate workmanship, carbonation or chlorides are well known, traditional concrete repairs, however, are aimed at restoring the structural integrity of the concrete, and not the visual qualities of the surface. These techniques which rely on the removal and replacement of sections of the deteriorated concrete as well as resurfacing or recoating of the material may be unsuitable for the repair of exposed concrete, as is explained in the site reports on Royan Cathedral, Parksluizen pumping station, and the Stuttgart Beethoven Hall. Recently developed restoration and repair techniques such as re-alkalization and desalination, that are presented here by Guri Nustad, offer solutions that are more satisfactory philosophically, visually and technically. Most important in terms of modern preservation is that both material and design authenticity can be respected to a much greater extent than is possible with traditional repair techniques. New opportunities become available to preserve modern architectural heritage for the future.

Wessel de Jonge, editor in chief

Next Journals

The upcoming Journal will be dedicated to the designation of the Bauhaus buildings for the World Heritage List (WHL). This marks the outstanding universal value of these buildings, but also brings the obligation to preserve and restore them properly. Journal 18, due for November 1997, will present the practical and theoretical works in progress in Dessau, in an international perspective. The edition will be guest edited by Berthold Burkhardt. France Vanlaethem and Marieke Kuipers of the ISC/Registers will report on DOCOMOMO's recommendation to ICOMOS on the WHL criteria, and provide a context for the designation of the Bauhaus.

In order to allow our membership to anticipate future themes of the Journal we inform you that editions are considered on Nordic MoMo (June 1998), Windows and Glass (November 1998), Re-use and Functional Change, MoMo in Asia and MoMo Engineering. Authors are herewith invited.

The DOCOMOMO Journals are published twice a year by the DOCOMOMO International Secretariat.

Contributing to Journal 18

DOCOMOMO Journal 18 is scheduled for November 1997. Contributors to this issue are kindly requested to note the following:

- Articles (with a maximum of 2500 words) are only accepted on floppy disk or when sent by e-mail (address: docomomo@bwk.tue.nl).
- All texts must be in English; if translated, please enclose text in original language.
- A short resume of the author(s), in relation to the contribution, must be included.
- Articles must be in by October 1, news items by October 15.
- News items must be in by October 1, when not available on floppy disk or by e-mail.
- Illustrations, preferably black-&-white photos and/or drawings, must be included; high quality and contrast required.
- Photographs must be submitted in print (no photocopies), scanned on a disk, or through the Internet (free of copyrights); the photographer or owner must be credited.

The editors are looking forward to your contribution.

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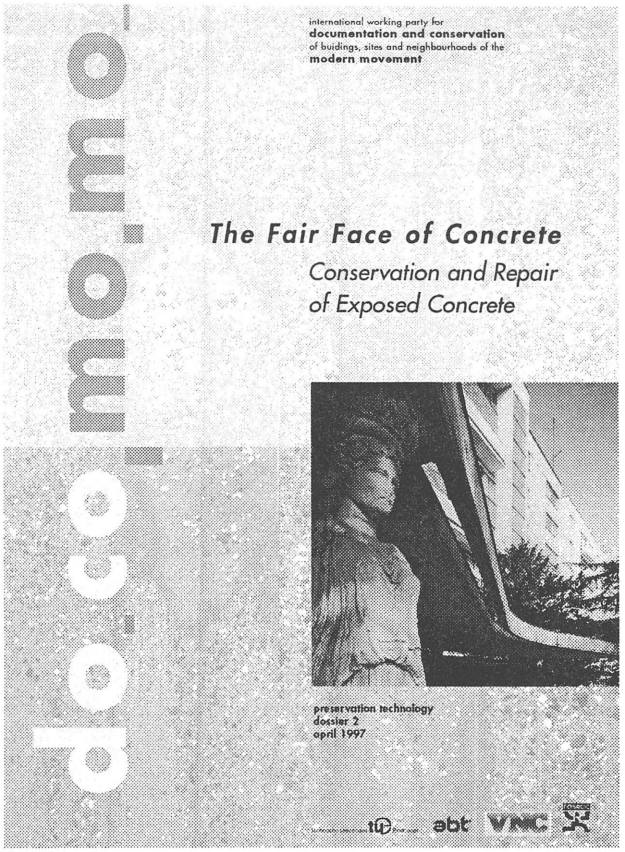

The Fair Face of Concrete

Conservation and Repair of Exposed Concrete

This forthcoming publication from DOCOMOMO will include papers presented at the 1997 seminar The Fair Face of Concrete; Conservation and Repair of Exposed Concrete, held in Eindhoven. Papers by researchers and practicioners from Germany, Great Britain, France, Norway, Denmark, Switzerland, the United States and the Netherlands are included, and many of them are case–studies.

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Letters to DOCOMOMO...

Schocken Library
Dear Mr. Henket, Thank you for your concern for the Schocken Library. The City Hall appreciates the importance and historical value of the Schocken Library as one of Erich Mendelsohn's first designs. Therefore, we are taking all the necessary legal measures to preserve it.
The Schocken Library has recently been approved as a historical landmark, and therefore is protected by law from destruction or reconstruction. Your concern for this building and for the preservation of the historical and creative value here is greatly appreciated, and I can personally assure you that we will continue to use whatever means necessary to protect this important piece of our historical and cultural heritage.

Ehud Olmert, Mayor of Jerusalem, Israel, November 7, 1996 (see also p. 14–15)

Mendelsohn/Luckhardt
Dear Sir, During our last travel to Germany we could observe, with great sorrow, that the Mendelsohn Hat Factory at Luckenwalde and Luckhardt Brothers' Haus am Rupperhorn (Berlin) were degraded quite terribly, something that humiliates us as architects, Europeans and human beings.
You may already know this. If so, consider this letter another call for preservation of these masterpieces, that we need to keep for our cultural heritage.

Francisco Alonso, Sebastián Araujo, Andrés Cánovas, Fernando Casqueiro, Carmen Espegel, Joaquín Ibáñez, Nicolás Maruri, Antonio Miranda, Jaime Nadal, Rafael Pina, Universidad Politecnica, Madrid, Spain, June 6, 1997

Bauhaus
Dear Sir, Let me add some remarks to the fine article on ISC/Registers by David Whitham on page 17 of Journal 16. David writes: '...indeed two MoMo sites, Brasilia and the Stockholm Woodlands Cemetery, are already listed.' I was somewhat surprised that he didn't mention the Bauhaus buildings of 1925–26 in Dessau. These are –as far as I know– listed on the World Heritage List since December 1996!

Dietrich Schmidt, Stuttgart, Germany, June 11, 1997

Dear Sir, As to Dietrich Schmidt's comment, I can only plead pure ignorance. When I wrote the report on Bratislava, in October '96, I didn't know about the Bauhaus listing. I must have learned of it soon after that because it was noted at the end of last year in the ISC/Registers 'tentative list'.

David Whitham, Midlothian, Scotland, June 12, 1997

COUNTRY/REGION	WP	CATEGORY	MEMBERS 1994	MEMBERS 1995	MEMBERS 1996	MEMBERS 1997	MEMBERS 1998
Argentina	X	40%	7	7	10	10	0
Australia		100%	1	1	2	3	1
Austria		100%	0	0	1	1	0
Belgium	X	100%	5	6	2	1	0
Brazil	X	40%	19	20	29	31	3
British Columbia, Canada	X	100%	0	0	0	10	10
Bulgaria	X	0%	0	11	12	1	0
Croatia	X	40%	0	0	0	0	0
Cuba		0%	0	0	1	1	0
Czech Republic	X	40%	8	8	8	8	0
Denmark	X	100%	0	12	12	10	10
Dominican Republic		40%	0	0	0	0	0
Estonia	X	0%	6	11	11	11	0
Finland	X	100%	6	6	8	1	1
France	X	100%	9	10	7	5	0
Germany	X	100%	12	14	17	15	3
Greece	X	100%	10	10	9	9	0
Hungary	X	40%	0	10	10	0	0
Iberia	X	100%	0	0	8	8	0
Indonesia		40%	1	1	0	0	0
Ireland	X	100%	0	0	0	0	0
Israel	X	100%	0	1	3	2	0
Italy	X	100%	35	35	23	23	0
Latvia	X	0%	0	7	7	0	0
Lithuania	X	0%	5	5	6	6	0
Mexico		40%	1	1	0	0	0
The Netherlands	X	100%	13	23	21	10	0
New Zealand		100%	0	0	1	2	1
Norway	X	100%	2	3	10	10	1
Ontario, Canada	X	100%	2	2	3	3	0
Paraguay		40%	0	0	1	1	0
Poland	X	0%	35	35	34	34	0
Québec, Canada	X	100%	16	20	11	7	0
Romania	X	0%	0	0	0	0	0
Russia	X	0%	16	16	0	0	0
Scotland	X	100%	4	5	9	8	0
Slovakia	X	0%	9	9	26	26	0
Slovenia	X	40%	0	10	10	0	0
Sweden	X	100%	13	13	22	24	2
Switzerland	X	100%	13	13	10	10	0
United Kingdom	X	100%	19	1	15	4	1
Uruguay		40%	0	0	0	1	1
USA	X	100%	2	7	21	20	4
Total	**34**		**269**	**333**	**380**	**316**	**38**

Updated until July 1, 1997

Membership 1997–1998
A note from our chairman

These figures will show you a lot both in an optimistic and pessimistic direction.
Yes, paid membership has been going from 269 in 1994 to 380 in 1996, which is good news. But the bad news is that eleven established working parties have less than 10 members which means that they have no voting power in the DOCOMOMO Council. And I will be strict on this rule from now on! Besides, as you will remember, no membership means no possibility to participate in an International Specialist Committee.
Now my problem is that my disappointment about the membership situation is not directed to you, because if you wouldn't be a member you wouldn't receive this journal and therefore wouldn't read this somewhat angry note. Please be so kind to help us raise the membership further, at least in the countries with less than 10 paying members. We need the money ($50 per member a year) to keep on providing you with the service you are used to. It is in your own interest to increase the number of members. Don't be passive, help yourself by helping us!

Hubert–Jan Henket, Chairman

Vision and Reality

Social aspects of architecture and urban planning in the Modern Movement

Fifth International DOCOMOMO Conference, Museum of Architecture, Stockholm, September 16–18, 1998

The ideals of human freedom and prosperity, whose roots stem from the Age of Enlightenment, have been implicit in the programs of the Modern Movement. These aspirations became the focus for intellectual clarification during this century; philosophers, sociologists, politicians, fine artists among many others have formulated proposals for the realization of the communitarian models. Political, cultural and socio–economic conditions have, however, frequently frustrated realization of these ideals. Simultaneously, changes in social values have transformed inherited conditions creating new ideals of freedom and material expectation. Such revised ideological perceptions become preconditions informing improvement or justifying obstruction. The advancement towards a modern society has followed various paths in countries having different political regimes and distinctive cultural, social and economic conditions. Architects and planners have striven to transpose the paradigms of freedom and prosperity into architectural and urban forms designed for future generations. Many are now recognized as the early visionaries of the Modern Movement; their architecture has evolved through built and unrealized projects which have gained wide international attention. In parallel with social ambition, pure artistic ideals as well as technical innovations have also influenced architectural development. The emphasis on universally held ideals has favoured the status of many internationally established practices as the only representatives of truly modern architecture. However, those architects who have united the ideals of freedom and prosperity anchored in local traditions, building materials and methods have not, as a rule, received the recognition they deserve for their building and planning work as modernizers and representatives of social ambition.

Social ideals have been particularly important in framing modern architecture and urban planning projects in the Nordic Countries where architecture and the built environment have developed their specific characteristics related to geographical, cultural and social circumstances.

Whereas the Fourth International Conference in Slovakia, 'Universality and Heterogeneity' examined how the tensions between universally held ideals and local expediency may be reconciled, the Fifth DOCOMOMO Conference in Stockholm, 'Vision and Reality' will promote analysis, description and debate around how social aspirations, in particular, have influenced the development of architecture and urban planning in different cultural and economic contexts between 1910 and the 1960s. It is the intention that, by focussing on these issues, this Conference will contribute to our understanding of the Modern Movement in architecture and planning.

Program

The Main Theme, Vision and Reality, will cover the first day and continue in parallel sessions during the second day of the conference. Formative contributions will be given by Mark Treib, Berkeley University, CA, USA; Werner Oechslin, ETH, Zürich, Switzerland; Wilfried Nerdinger, Technical University Munich, Germany; Nils–Ole Lund, Århus University, Denmark; and Sverker Sörlin, Umeå University, Sweden. In the evening of the second day, September 17, a concluding debate will be conducted on the Main Theme. The second and third days will feature Parallel Sessions with papers on the issues established by the DOCOMOMO International Specialist Committees: Registers, Education, Technology, Urbanism and Landscape, and Conservation. The Conference will be concluded with a session of the DOCOMOMO Council on Friday, September 18, 1998.

Papers for the Parallel Sessions will be reviewed by the International Specialist Committees' chairmen. For the selection of papers for the Main Theme and the composition of the Final Programme a Scientific Committee has been appointed. Its members are Riitta Nikula, Helsinki University, Finland; Carl Otto Ellefsen, Oslo School of Architecture, Norway; Nils–Ole Lund, Århus University, Denmark; Jöran Lindvall, Swedish Museum of Architecture, Stockholm; Eva Rudberg, DOCOMOMO Sweden; and Maristella Casciato, Marina Botta, Hubert–Jan Henket, and Wessel de Jonge, all members of the Executive Committee.

Organization

The Conference is an initiative of the Swedish Museum of Architecture with the Swedish DOCOMOMO Working party. The Conference is organized in collaboration with the DOCOMOMO working parties in Denmark, Norway, Finland and with a Modern Movement interest group in Iceland. The full text of the Call for Papers, including registration forms, is available on the Internet: www.ooo.nl/docomomo. Deadline for submitting abstracts is September 15, 1997. The Final Program will be published in March 1998.

For further information contact the DOCOMOMO Conference Office, Swedish Museum of Architecture, Skeppsholmen, 111 49 Stockholm, Sweden, tel. +46–84630500, fax +46–8–4630560.

Conference tours of the Nordic capitals

An optional post conference tour of Stockholm is scheduled for Saturday, September 19. To provide participants an opportunity to become acquainted with architecture and urban planning in the other Nordic capitals, further pre– and *post*-post–conference tours will feature Copenhagen, Oslo, Helsinki and Reykjavik.

Copenhagen, September 12–14

A tour of MoMo architecture and urban planning in Copenhagen is organized by the Danish DOCOMOMO Working party that will also arrange a program of cultural activities. Prior to the bus tour an exhibition on Danish modernism will be opened on Saturday, September 12, at 1.00 pm, at the Danish Centre for Architecture 'Gammel Dok', followed by a reception.
On Sunday September 13 the bus tour will start by visiting the inner city in the morning, and the Bellevue Theatre and its surroundings in the afternoon,

Bella Vista in Copenhagen (Arne Jakobsen, 1932). Period photo, Kunstakademiets Bibliotek.

featuring buildings designed by, amongst others, A. Jakobsen and M. Lassen. A dinner party at 'Gammel Dok' will conclude the day.
Lectures on MoMo initiatives in fine arts, film, music, theatre and sports are scheduled for Monday September 14, followed by a tour hosted by the Federation of Danish Architects in the recently built Architect's House. A concert in the Danish Radio Concert Hall, designed by V. Lauritzen, will be followed by dinner dancing in the K.B. Hallen.
• Fee: DKr 2.800, including bus tours, hotel, all meals and entertainment. Maximum number of participants is 45.

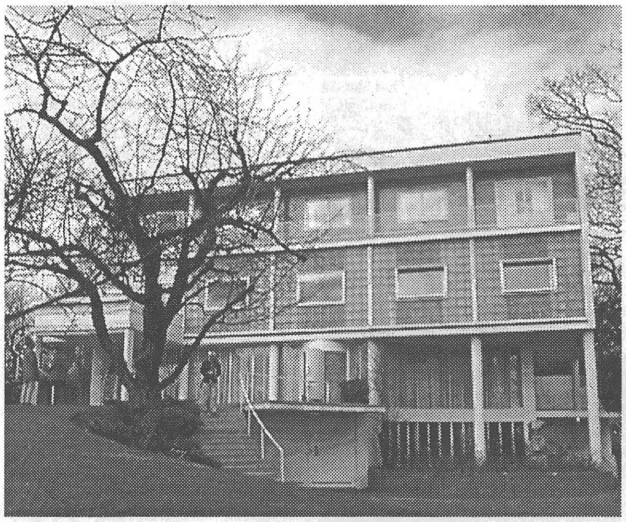
More information from the Danish DOCOMOMO Working party, Arkitekturskolen i Århus, Nørreport 20, 8000 Århus C, Denmark.

Oslo, September 14–15

The Norwegian DOCOMOMO Group is looking forward to present some outstanding examples of Norwegian modern architecture, located between the hills and the fjords: social housing districts, private residences and public buildings, both in urban and rural contexts. On Monday September 14 the following buildings will be visited: Café Frognerseteren, offering a view of Oslo (H. Munthe, 1891), Semi–detached houses (C. Norberg–Schulz and A. Korsmo, 1954), Villa Schreiner (S. Fehn, 1964), Hvalstrand Spa (A. Peters, 1937), Villa Grung (G. Grung, 1963), Villa Ditlev-Simonsen (O. Bang, 1937), Villa Stenersen (Korsmo, 1939), the Norwegian Museum of Architecture (Bergersen, Gromholt, Ottar, 1993), and the Astrup Fearnley Museum of Modern Art (LPO Architects, 1993). On Tuesday September 15 visits to the following structures are scheduled: Vestkantbadet swimming pool (Bjercke and Eliassen, 1931), Social housing from the 1920s and 30s (Rivertz, Hals, Morgenstierne & Eide), Villa Damman and Havna Allé, guided by Sverre Fehn (A. Korsmo and S. Aasland, 1930), St. Hallvard church and monastery, guided by Kjell Lund (Lund and Slaatto, 1966/1993), and the Samfunnshuset (O. Bang, 1940). A guided walk

through the centre of Oslo, including the Town Hall (A. Arneberg & M. Poulsson, 1950) and the Klingenberg kino (G. Blakstad & H. Munthe–Kaas, 1938) will be followed by a walk through the docklands, including the 'Aker Brygge' (N. Torp, 1980s) and the Kunstnernes Hus (G. Blakstad & H. Munthe–Kaas , 1930).
The tour will be concluded with a view of Oslo by night from the SAS hotel (J. Lunding, 1975).
• Fee: NOK 800, including coach transportation and guiding, guide leaflet and half board.
Accommodation is not included, but assistance regarding reservations may be offered. Private accommodation by the members of DOCOMOMO can be arranged for a limited number of the participants. Minimum number of participants is 20.

More information from the Norwegian DOCOMOMO Working party, Norsk Arkitektur Muséet, Kongensgate 4, 0153 Oslo, tel. +47–22424080, fax +47–22424106.



Villa Stenersen in Oslo (Arne Korsmo, 1939). Photo: M. Disen, 1994.

Stockholm, September 19

The post–conference tour first visits the former Sveaplan secondary school for girls designed by N. Ahrbom & H. Zimdahl in 1931, successfully restored in 1994–96, and today used by the University of Stockholm. On the way to the suburb of Vällingby, Traneberg will be passed. It is one of the hilly areas around Stockholm developed in the early 1930s with three–storey 'lamell' houses, as well as Norra Ängby, an area with self–built single family houses.
Vällingby (1952–56) was planned by S. Markelius as an ABC suburb (A=work, B=residence, C=service centre), for 26,000 inhabitants, and linked to the city by a subway. Its station in the centre was designed by Ahlgren–Olsson–Silow. Driving through Blackeberg, a district built in 1950–55 according to the neighbourhood principals, two areas will be visited. Södra Ängby, a garden city with 500 flat–roofed single family houses (1934–40), most of them designed by E. Engström, and Ålstensgatan with its 96 row houses in zig–zag groups, designed by P. Hedquist and built by O. Engqvist in 1932.
After lunch, probably at L. and C.E. Geisendorf's St. Görans school, the tour visits the collective house in John Ericssonsgatan, also designed by Markelius in 1936 and restored in 1992. At the Woodland Cemetery, south of Stockholm, visitors will have the opportunity to experience the beautiful park landscape and the different chapels, masterworks of E.G. Asplund and S. Lewerentz. Since 1994 it is included in the World Heritage List.
Upon returning to town the Gärdet area will be visted, with its apartment blocks of the 1930s, among others the gorgeous three–storey houses by S. Frölen. Also, a visit will be arranged to Starrbäcksängen, a newly developed housing area with a bicycle wheel lay out, planned by A. Wolodarski and designed by J. Nyren in 1987. The tour will be concluded at the

Housing district in Blackeberg, Stockholm (P. Hedquist, 1950–53), owned by the 'Familjebostäder' Housing Corporation. Photo: Thomas Hjertén, Swedish Museum of Architecture.

Student House of the Royal Institute of Technology (1928–30) designed by S. Markelius and U. Åhren.
• Fee: US $ 50, including bus transport and guiding, guide book in English, refreshments and lunch.

More information from the DOCOMOMO Conference Office, Sweden.

Helsinki, September 20–21

On the evening of Saturday, September 19, participants of the conference can take the ferry from Stockholm to Turku, allowing an opportunity to enjoy the Finnish archipelago with its thousands of islands. The boat will arrive on Sunday morning. In and around Turku early buildings by Alvar Aalto, the Resurrection Chapel, villa's of the 1930s and housing

of the 1940s by Erik Bryggman will be visted in the morning. After lunch a visit to Alvar Aalto's Paimio Sanatorium is scheduled, of special interest since it has just been nominated for inclusion in the World Heritage List. In the evening guests will be accommodated in a 1940–50s hotel in Helsinki.
On Monday September 21, the Finlandia Hall (1971), Aalto's House of Culture (1958), Käärmetalo apartments (Serpent house, 1951), the Olympic Village (193940) and the Sahanmäki housing area from 1950s will be visited. After lunch, experts from the department of architectural history will host a visit to the Otaniemi Technical University and campus. The nearby Tapiola Garden City will show Finnish modernism from three decades in a nutshell.
Back to Helsinki, a farewell drink on a notable modern terrace overlooking the city and harbour, will conclude the tour.
• Fee: between FIM 500 and 650 (depending on the level of accommodation), including boat transfer from Stockholm to Turku (cabin accommodation on board), bus transfers in Finland, one night hotel

Tapiola baths in Tapiola (Aarne Ervi, 1965). Photo: Museum of Finnish Architecture.

accommodation in Helsinki and an excursion booklet. For those planning to extend their stay, additional assistance will be offered.

More information from the Finnish DOCOMOMO Working party, Museum of Finnish Architecture, Kasarmikatu 24, 00130 Helsinki, Finland, tel. +358–9–661918, fax +358–9–662573, e–mail arkmuseo@pp.kolumbus.fi.

Reykjavik, September 20–21

Upon arrival in Reykjavik on Sunday afternoon, September 20, guests will be offered a brief sightseeing tour of the city, followed by a swim in the Reykjavik geothermal swimming pool. Dinner at Perlan will offer panoramic views.
The bus tour on Monday, September 21, through the central districts of Reykjavik will focus on the early influence of the planning theories of the garden city movement, the early examples of modern co–operative housing, private villas and public buildings, as well as regional characteristics in construction and materials (concrete, corrugated metal, mineral coating). Lunch will be set at the Nordic House by Alvar Aalto.
Sites and buildings outside Reykjavik will provide a context of Icelandic landscape. Examples include the Keldur laboratory buildings (H.K. Davidsson, 1948–62), Reykjalundur sanatorium (G. Halldorsson, 1944–45), Gjufrasteinn, home of writer Halldor Laxness (A. Palsson, 1945), Thingvellir historic site, power plants at the river Sog (S. Gudmundsson and

Two–storey row houses in Reykjavik (Gísli Halldorsson and Sigvaldi Thordarson, 1942–43). Period photo, Reykjavik Municipal Arts Museum.

E. Einarsson, 1935–38) and the Olfusborgir holiday village (S. Thordarson, 1950s).
• Fee: approximately US $ 300, including bus tours, two nights in a hotel (single room rate), dinner at Perlan (beverages not included), lunch at Nordic House and a buffet at the Reykjavik Art Museum on Monday. Guiding will be offered by members of the Modern Movement interest group in Iceland.
Participants coming from Stockholm may prefer to arrive on Saturday September 19, because of a discount airfare. The costs for one extra night in a hotel is not included in the fee.
More information from Petur Armannsson, Reykjavik Municipal Art Museum Kjärvalsstodum, Flokagotu, 105 Reykjavik, Iceland, tel. +354–5–526131, fax 354–5626191.

ISC/Registers

In July the ISC/R had a full meeting in order to discuss the last draft of the WHL report to be sent to ICOMOS. At the same time, the opportunities for future publication of the DOCOMOMO Register were discussed with the ISC/Publications.
We are happy to have achieved agreement about the outlines, but we need more time for producing the final versions of our proposals. Therefore we apologize for the further delay in briefing the working parties, which is now scheduled to be published in Journal 18 next November.

(Report by Marieke Kuipers secretary of the ISC/R)

ISC/Urbanism

During the meeting of the International Specialist Committee on Urbanism on September 20, several decisions were made, and presented to the Council the same afternoon. One of the main decisions was to establish the ISC/Landscapes & Gardens as a sub–committee to the ISC/U (see also Journal 16, p.9), as well as to define the general objectives of the committee as follows:

a) Make a survey of urbanistic experiences (at various scales) based upon the principles of the Modern Movement.
b) Develop a systematic discussion about the relations between conservation and urban dynamics, paying special attention to the present situation and future development possibilities.

In order to reach these broad objectives before the 5th International Conference in Stockholm, our efforts should be concentrating on the development of a methodology and on the definition of criteria for selection and analysis. During the first year, each member of the ISC/U will have to submit three to five case studies, with significant historical importance and relevance towards the relation between conservation and urban development. These result will be presented in a meeting, somewhere in 1997. At that time we should make decisions in order to reach a common work methodology, to be tested in the second year. These result will be presented during the Stockholm conference.

According to what was decided during our meeting in Slovakia, a permanent exchange among the members of work being carried out will be very important, starting with the first case study chosen by each individual. We hope to meet in the winter of 1997.

(Report by Marco Aurélio Gomes, chair of the ISC/Urbanism)

ISC/Publications

The ISC/P had a meeting in Holland this summer where quite a few matters were discussed. To start with, the overall proposal to concentrate international DOCOMOMO publications with one publisher/distributer was rehearsed. The advantages in such an arrangement combine the specialist knowledge and interest of an established worldwide movement such as DOCOMOMO with those of a professional agent having presentation, production and distribution skills with state of the art access to the Internet. Taking this into account the ISC/P conclusions were to go on with a general informative Brochure which should be available for mailing by 15 October 1997 as well as the book 'Modern Movement Heritage: a Challenge to Manage', timing being crucial to ensure publication in time for Stockholm 1998.
The DOCOMOMO International Journal was discussed at length. Six conclusions emerged:

- the role of the editor would become considerably more demanding.
- the separation of news directed at DOCOMOMO members from the main body of the Journal which consists of specialist papers (directed at a professional audience) may best be achieved as two publications and distribution via the Internet if funds will permit.
- the design of the Journal will require review to make it feel more 'generous', to include the cover, which will need to attract across–the–counter interest.
- an Editorial Board (composition to be decided) would benefit from the presence of authoritative 'outsiders'.
- serious consideration to include selected, discrete product advertisement relating to DOCOMOMO.
- major readjustment, which will require more substantial member involvement, improving the quality of productions to include a programme of activities to take place between Stockholm and Brasilia (to be presented in Stockholm).

More publications were discussed:
Technology book– this proposal by Wessel de Jonge (who would edit) is destined to contain specialist sections (e.g. Concrete, Plastics, Steel Windows etc).
Case Study book– this proposal by Dennis Sharp would consist of a design guide and detailed case studies e.g. Lascaze or Connell Ward and Lucas.
International Register– this would be a favourite form of celebration in Brazil in publication of The International Register. Whether this might be in the form of hard copy fiches and CD–Rom, and how extensive will be the coverage requires further investigation.
The ISC/Publications has, since Sliac, inherited the funding portfolio but it was agreed that although one crucial aspect of the publications drive is to attract

funds from various sources, responsibility for fiscal policies would, in future, rest more properly with the Executive Committee. A top–of–the–head estimate of annual costs of the secretariat is $45,000 so any funding target should aim for this sum as the minimum. It was agreed to give further consideration to membership 'levels' based upon financial potential. Academic and professional institutions and industrial companies should be mailed to in order to attract response in time to enrol new members and funds from January 1998.

(Excerpt from report by Allen Cunningham, secretary of the ISC/P)

Endangered sites
World Monuments Watch 1998

announcement

The World Monuments Watch is a comprehensive global program aimed at identifying and preserving the world's endangered cultural landmarks. It was launched in 1995, as a program of the World Monuments Fund, a private not-for-profit organization established in 1965 to help preserve the world's artistic and architectural heritage. The World Monuments Watch encourages protection of endangered cultural heritage sites worldwide with a two–part program: an annual *List of 100 Most Endangered Sites,* intended to focus local and international attention on the perils confronting these sites, and the *World Monuments Watch Fund.*
In its first year the World Monuments Watch has enjoyed great success around the globe. The '1996 List of 100 Most Endangered Sites' included sites from 57 countries. It has been published around the world through newspapers, magazines, television and radio. All of this attention has worked to focus international concern on the threats afflicting cultural heritage and initiating a dialogue towards finding innovative solutions.
Selection for the annual List of 100 is based on three criteria:
- significance, the intrinsic artistic and/or historic importance within its cultural context;
- urgency, the need for immediate intervention in relation to four specific degrees of urgency (disaster occurred, disaster imminent, evident pattern of destruction, long range implicit danger);
- viability, the existence of remedies to counter threats, and an indication of a practical plan to apply such remedies.

Complete nominations will be accepted from all sources, but professional advice is strongly recommended. Consult of the definitions used by the UNESCO World Heritage Convention is encouraged. The owner is not necessarily required to endorse the site's nomination for the List of 100.
In addition to the list, the World Monuments Watch Fund, through financial contributions from various donors, has already been able to award almost $ 1.5 million in grants ranging from $ 6,000 to $ 100,000 to 37 projects in the first year. The 1997 program is now coming to a close and will be published shortly. Although not all sites on the Annual List of 100 are provided automatically, an annual average of approximately $ 1 million will be distributed in grant funding through a gift from the American Express Company, and awarded on a competitive basis to selected sites on the List of 100.
To be eligible for a grant, the owner's written approval of the nomination will be required for projects that involve on–site activity. Eligible projects might include strategic planning projects, emergency and technical assistance projects, educational projects, and conservation treatment projects. Projects that already have necessary approvals are stronger candidates for financial assistance.

Tel Aviv, the 'White City' in Israel, was one of the few modern items to be included in the 1996 List of 100 Most Endangered Sites. Photo: Wessel de Jonge.

The continued success of the program lies directly in the quality of the sites and the nominations received. Colleagues in the field are therefore invited to submit or encourage submission of the most significant and endangered sites in the world. Each nominator is asked to submit only one nomination per country.
In order to be eligible for the 1998 List nomination completed forms are to be submitted by November 15, 1997, with comprehensive documentation. Copies of the Nomination Form and the Guidelines may be requested from the World Monuments Watch offices at the address given below.

More information from: World Monuments Fund, 949 Park Avenue; New York, New York 10028; USA; tel. +1–212–517 9367; fax. +1–212–517 9494.

An endangered modern town behind the Urals

by Marieke Kuipers

After the Russian Revolution of 1917 many modern architects were attracted by the challenges of building a new Soviet society, including mass housing projects and industrialization. Especially in the Urals and Siberia were promising mining areas where coal, chemical and steel industries could be developed together with large cities. One of the idealistic foreigners who worked in Siberia was the Dutch architect J.B. van Loghem (1881–1940). Invited by his communist countryman Ir. Sebald Rutgers – who was in 1921 one of the founders of the autonomous industrial colony (AIK) Kuzbass – he went in 1926 to the mining district of Kemerovo. There, he constructed dozens of miners houses, a school, a bathhouse and several industrial buildings, combining both the principles of the Modern Movement and the regional building traditions. Many of his buildings still remain, albeit partly rebuilt or neglected.

MoMo freaks

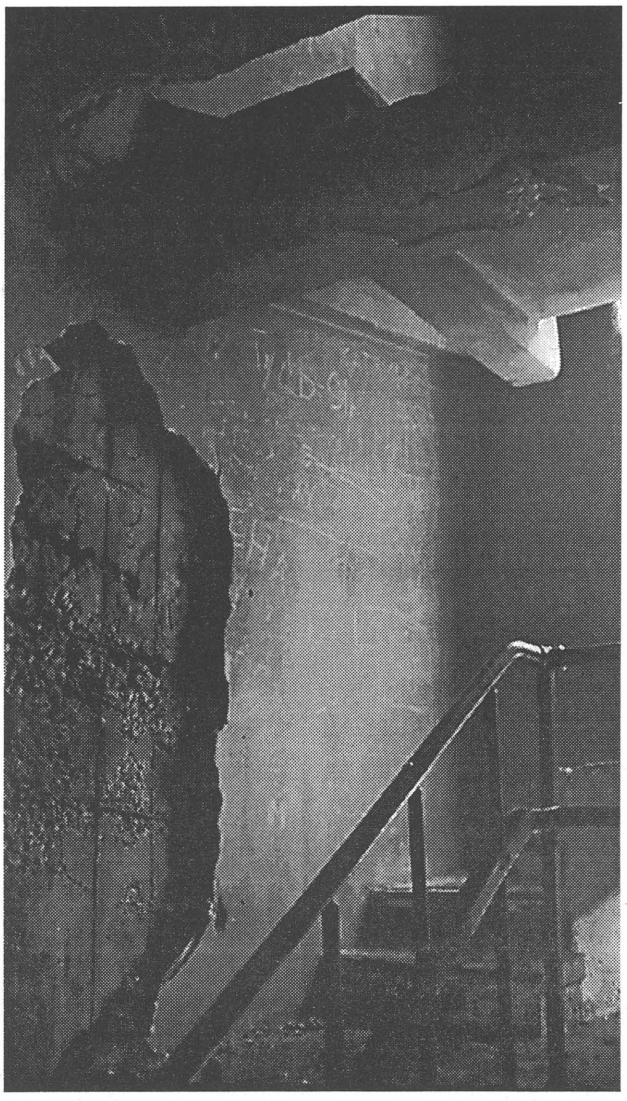
Last October the 75th anniversary of the AIK Kuzbass was celebrated with a two day conference 'Days of Dutch Culture in Kuzbass' in the Town Hall (organized by the regional and municipal authorities of Kemerovo) and two exhibitions in the 'Rutgers House Museum' and the State Archive. Moreover, in the regional House of Architects, a Dutch exhibition on the work of Van Loghem was opened by the vice governor and the cultural attaché of the Dutch embassy in Moscow. This interesting exhibition is composed by Rudolphine Eggink of the Delft University of Technology (see her report in *Journal 14*, pp. 12–13) and it will travel on to Novokuznetsk, Novosibirsk, Ekaterinburg, Moscow and St. Petersburg during the current Peter the Great Year.
For a next visit it would be interesting to go to Magnitogorsk as well because Russian, German and Dutch MoMo architects have been active there too. Visitors from the West are only recently allowed to travel in these remote areas and it is certainly rewarding to follow the traces of the revolutionary architects of the Modern Movement. Our trip was just a start for (re–)making contact with interested Russian colleagues and for future investigations. For instance, in Novosibirsk several projects of constructivist architects still can be found, representing different building types. One of these is the housing block where El Lissitsky's widow S. Küppers (of German origin) had lived in exile during the last part of her life.
But the true place to be for MoMo freaks is Ekaterinburg, the capital of the Urals (and named Sverdlovsk from 1924 to 1991) with 1,25 million inhabitants today. In 1928 a functionalist extension plan was made, which was realized for the larger part. During the last ten years Lyudmilla Tokmeninova from the Urals State Academy of Architecture and Arts (and the related Research and Information Center for MoMo architecture; see *Journal 12*, November 1994, p. 38) traced over 140 Modern Movement buildings in this town. Besides, she produced an impressive amount of 'passports' for the legal protection of about 50 of them (from which about 25 are now designated in the national register). However, in practice this protection is not of great help for saveguarding the buildings, in spite of the official approval by the Ministry of Culture in Moscow.
Due to recent political and economical changes many buildings are threatened by radical rebuilding, neglect or even demolition.
The authorities – in most cases still the owners – no longer have the money for maintenance and, moreover, the inflation of the rubel is continuing.

The UZTM Watertower in Ekaterinburg, designed by M.V. Reisher, 1929. All photos: Marieke Kuipers.

Watertower adoption

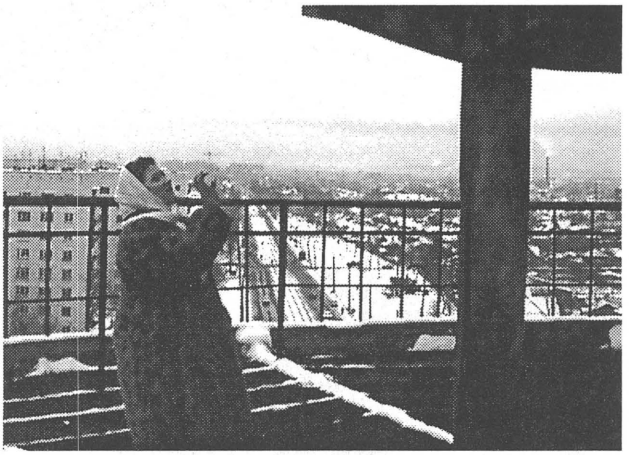
The most striking example is the abandoned UZTM watertower, designed by M.V. Reisher in 1929 for the Sotsgorod Uralmashzavod area. Originally, this cylindric landmark of 29 m height was a real beauty of MoMo architecture and offered a magnificent view over the town and nearby forest. Some years ago it lost its function for the drinking water supply and now it is left to the severe Siberian climate without any attention. The experimental reinforced concrete of the main structure is seriously damaged by frost and the iron Intze reservoir – the first in the Soviet Union which was produced by use of electric power – is removed. Also, the wooden window frames have been taken away, making the use of the awkward staircase a very dangerous experiment; because of the early snow they were really slippery. Thanks to the initiative of Lyudmilla Tokmeninova and Jan Molema from the Delft University a group of eight of his students has now adopted this watertower for elaborating an appropriate re–use and restoration project.

Concrete damage inside the (now open–air) staircase of the UZTM watertower.



In the meantime a two–days seminar concerning the preservation of MoMo monuments in Russia and the Netherlands was held in the building of the Urals State Academy of Architecture and Arts (originally a MoMo–building). At the end we made further plans to prepare a joint publication and to introduce the concept of 'Open Monuments day' in order to raise more interest and support for the unknown treasures of MoMo architecture and town planning in Ekaterinburg. This time we could just see a glimpse of Ekaterinburg's other functionalist highlights, such as the Uralmasch plant, Dynamo sports complex, Iset hotel (part of the Gorodok Chestikov housing estate, formerly a KGB premises) and Postoffice, all built within the 1928-36 period like the watertower and most of them still in use for its original function. Next year we shall return to our Russian friends for continuing our projects. Behind the Urals there is indeed a big job to do for the documentation and conservation of buildings, sites and neighbourhoods of the Modern Movement!

Marieke Kuipers is senior consultant at the Netherlands Department for Conservation and secretary of the DOCOMOMO ISC/Registers.



Russian DOCOMOMO member Lena Dvoinikova inspecting damage on top of the UZTM water tower against the backdrop of the rational layout of Ekaterinburg

The Ural State Academy of Architecture and Arts in the seat of the DOCOMOMO chapter in the Urals.

Mendelsohn's Library in Jerusalem

Call for support

by Silke Schaeper

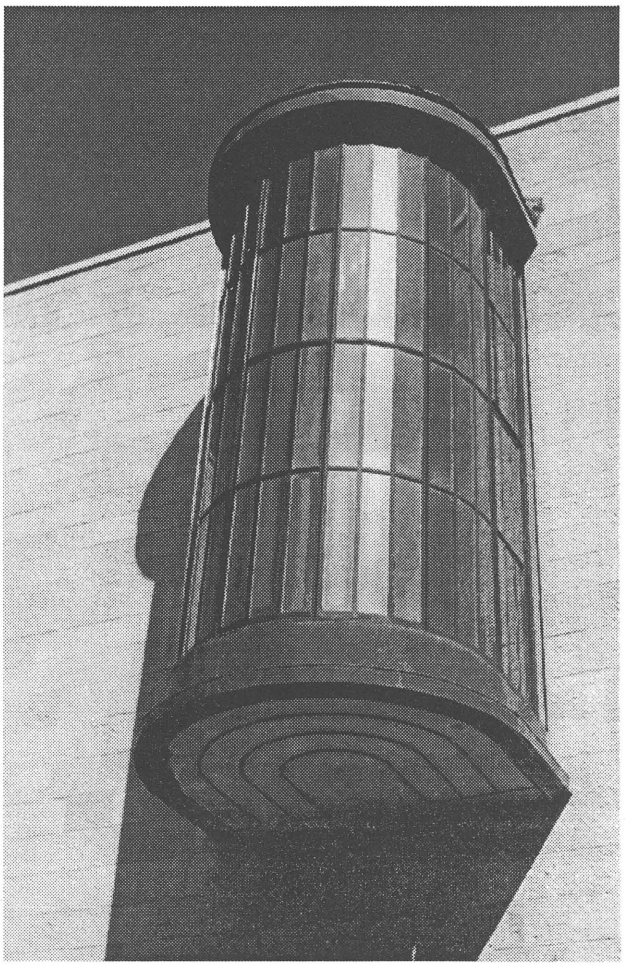
A group of people has begun to campaign for the conservation of the 'Schocken Library' in Jerusalem, built by Erich Mendelsohn in 1935–37 for the German–Jewish businessman Salman Schocken (1877–1959). As in the case of the 'Einstein Tower' in Potsdam, Mendelsohn designed not only the building, but the furniture and fittings as well. The exterior, interior and contents of the building should, therefore, be regarded as one whole. More than sixty years later, it is Mendelsohn's only building in Israel that is left completely intact.

Gesamtkunstwerk

The Schocken Library is yet another result of the long time collaboration between the entrepreneur Salman Schocken and the architect Erich Mendelsohn.

Schocken first met with Erich Mendelsohn's work on the occasion of an exhibition of the architects' drawings that took place at the Cassirer art gallery in Berlin in 1919. Subsequently, Schocken commissioned the architect to build his Nuremberg (1926), Chemnitz (1928) and Stuttgart (1930) department stores. After emigrating to Palestine, Schocken bought a plot of land in Jerusalem and commissioned Mendelsohn to design his private home, together with a library that was to house his books, manuscripts and art collections, his private archives, a literary research institute, a lecture hall and his offices. The plans for house and library were separated in the end of 1934 and construction of an individual library building was accomplished in the beginning of 1937. In Palestine, Mendelsohn worked with local materials: the facades of the Schocken Library are clad in Jerusalem stone, floors and staircases are tiled with local marble, book shelves are lined with lemon wood and tables are topped with local Jordanian marble. Mendelsohn and his assistants were also responsible for every detail of the interior design – the furniture for Schocken's private office, coffee tables, wall lights, bronze standard lamps, a special hanging lamp of glass, clothes hangers, upholstered chairs (fabrics of horse hair), door handles, light switches, heating and

Bay window in the south façade of the main room. All of Mendelsohn's works in Jerusalem are clad in stone.

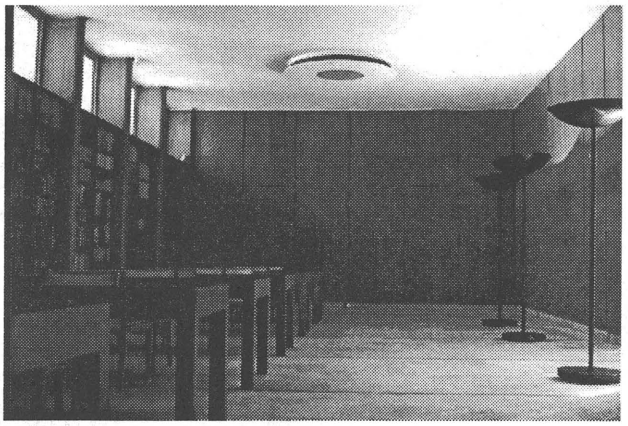


The main staircase in the hall.

ventilation outlets. Even the *mezuzot* were commissioned from Mendelsohn's office – oblong small boxes fixed to the right doorpost at the entrance to every traditional Jewish home, containing a piece of parchment bearing handwritten biblical text and prayers in Hebrew.

Campaign

The library building was classified as a historical monument by Israeli law. However, the library is threatened since 1996 by plans of the owners to sell the building to the highest bidder, together with plans to build an extension to the building which would destroy the bookstacks – the very heart of the library. We believe that public action could save the Schocken Library. For that end, we are establishing a public committee consisting of well known figures in the fields of architecture, art history and politics both in Israel and abroad. We have established contacts with the Embassy of the Federal Republic of Germany in Tel Aviv in our attempt to seek immediate help for urgent preservation measures (climate control, UV–light filters etc.) and are involved in applying for grants that will enable us to document the library and to draw up and execute a comprehensive conservation project.



Interior of the main hall on the upper floor, showing climatizing unit at the ceiling, bronze standard lamps, and lemon wood bookshelves with bronze framed glass doors.
All photos: Silke Shaeper.

For information and support, please contact: Ms. Silke Schaeper, Simon Dubnow Institut, Universität Leipzig, Augustusplatz 9, 04109 Leipzig, Germany, Tel: +49341–9732350, Fax: +49–341–9732359, e–mail: schaeper@rz.uni–leipzig.de.

'Modern Matters' book

'Modem matters: Principles and Practice in Conserving Recent Architecture', by Susan Macdonald (ed.), Dorset 1996, 184 pp., 62 b/w illustrations, ISBN 1–87339423–3 (hardback).

by Dennis Sharp

A well organized international two-part conference on modern architectural matters was held at the RIBA in 1995.
The papers, edited and printed largely as delivered, are available in one hard copy volume, ably prepared by DOCOMOMO UK secretary Susan Macdonald.
Some papers warrant the detailed study that publication affords, others might more usefully have been left alone! It inevitably reflects the mixed bag of the conference itself which ranged through a bewildering number of issues from current legislation on the listing of modern buildings to specific examples of restoration, interventions and repair techniques.
Andrew Saint set a few hares running with an ambitious attempt to formularise the 'frail bark' of philosophical principles of modern conservation. It was a brave attempt to provide categories of value and judgement (number, technique, intention, performance, viability and appeal) and as thorough as one might expect from professor Saint, marred only by a lack of any positive conclusions.
A contrast to the philosophical approach were the complex papers provided by the scientists (Glass and Buenfeld on concrete and Pullar–Strecker in corrosion damage).
John Allan's now familiar, but always engaging, analysis of his own practice's experience in the modern conservation field makes good reading.
The conference culminated, as does this useful record of the proceedings, in the presentation of a number of case studies including Wright's Southern Florida University, Hans Scharoun's WUWA multifamily housing at Breslau (now Wroclaw) and Gerrit Rietveld's Venice Pavilion, fastidiously restored by DOCOMOMO's own international secretary Wessel de Jonge.
A thorough and thematic bibliography completes the book giving it a value far beyond the memory span most of us have for conferences of this kind.

Dennis Sharp is an architect and architectural historian in London. Review previously published in DOCOMOMO UK Newsletter 9. Reprint by kind permission of the author.

Villa Tugendhat in Brno

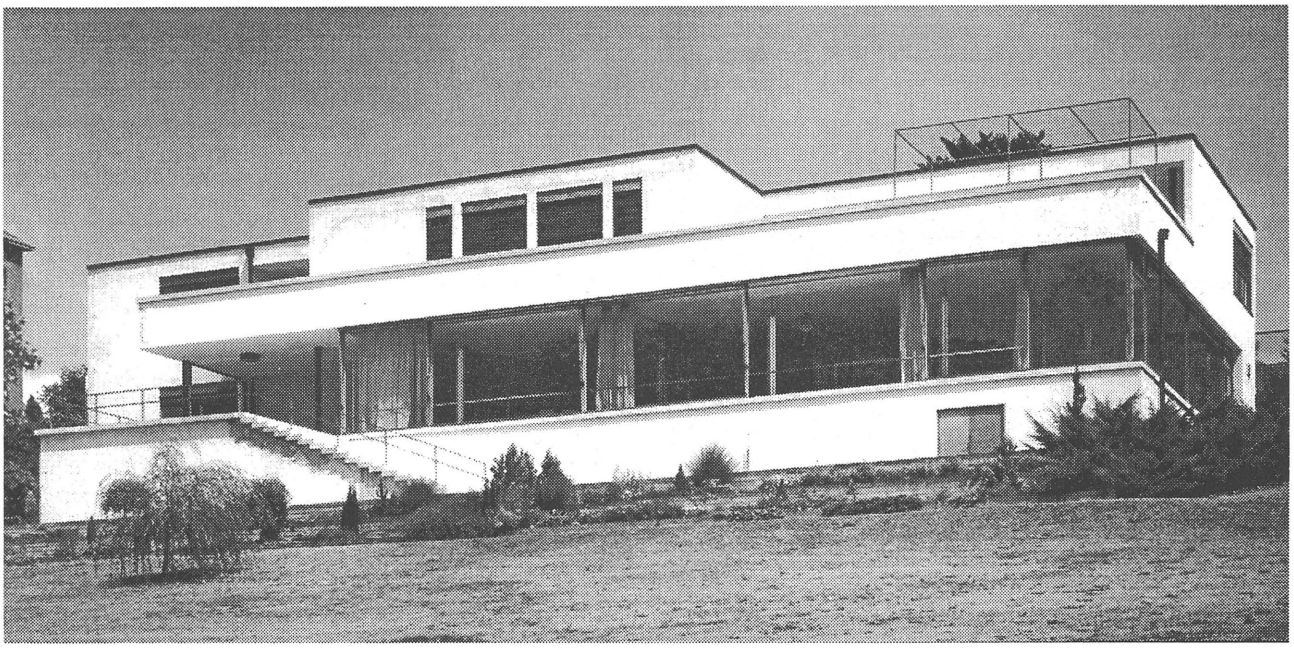
Continued restoration

by Peter Lizon

Years of intervention by dedicated individuals and a new democratic government after the Czecho–Slovakian Velvet Revolution, in November 1989, led finally to the opening of the Villa Tugendhat to the public, on 1 July 1994. With the integral furniture and furnishings missing, visitors complained that the total design concept of Mies van der Rohe needed to be restored, as originally conceived, to appreciate its full impact. The continued Restoration Project Phase One has now been accomplished. A replica of the original Great Room interior architecture has been installed and opened at the occasion of Mies van der Rohe's 110th birthday, on 27 March 1996. The black and white imagery of the space, as known from the 1930s, has been brought back, today, in living color.

From the time when the Tugendhats had to leave their home, in 1938, the villa had been subject to neglect, destruction, misuse and inappropriate repair. After World War II, under the totalitarian regime, a number of pleas were made by architects, private individuals and institutions to save the decaying structure from total destruction by various unsuitable adaptations. Finally, on 6 December 1963, the villa was granted a status of a National Cultural Monument. But the question of restoration of the villa to its original appearance had been repeatedly tabled at the decision making meetings of the National Council at the City of Brno. It was not until 1969, when the motion of 'putting an end to the improper use of the villa' and a complete restoration of the structure and its site was approved by the National Council in the City of Brno. Undoubtedly, the retrospective exhibition of Mies' work held in Brno in 1968–69 and the lecture given at that occasion by Grete Tugendhat had helped the decision on the restoration.

The plans for restoration and renovation were executed by architects Kamil Fuchs with Kutejová and Janecek of the Brno offices of the State Institute for Reconstruction of Historical Towns and Buildings. Architect Dirk Lohan, a longtime associate of the late Mies van der Rohe in Chicago, was consulted on the aspects of restoration plans. While the restoration and renovation effort lead by architect Kamil Fuchs (son of the renowned Bohuslav Fuchs), finished in 1985, was commendable, it was incomplete. Kamil Fuchs indeed saved the house from destruction by weather and age. However, appropriate material and technology were not available at the time and the original interiors and furniture of the villa were not included in the restoration project. Shortcomings included the large glass panes in the Great Room made of two sheets of glass with a neoprene butt joint and the entry vestibule curved milk–glass wall made out of narrow pieces of Plexiglas. Shop window size panes and curved glass were unavailable in the socialist Czecho–Slovakia at the time. What was missing most, however, was the original furniture designed and integrated by Mies specially for the house. Thus, the restoration was incomplete and the spatial total design concept effect unfulfilled. Inaccessible to public, the villa served for entertainment, parties, meetings and other inappropriate activities. The house bedrooms had been furnished like hotel guest rooms with under



View from the garden of the Villa Tugendhat (1928–30) by Ludwig Mies van der Rohe. Photo: Museum of the City of Brno, 1995.

counter refrigerator and television set in each room and the Great Room was equipped with conference furniture. Unfortunate modifications were made to the kitchen area and other support spaces.

Onyx wall

The saga of the villa and its restoration was discussed in a cover article of the AIA (American Institute of Architects) magazine *Architecture*, November 1986. The awareness of the villa situation among architects and friends of architecture was further heightened when I initiated an adoption of the AIA 1991 Resolution W–1 at the AIA Convention in Washington, DC. The resolution on 'Continued Restoration of the Villa Tugendhat', sponsored by my state chapter of the AIA (the Tennessee Society of Architects), called for 'coordination and encouragement of vendor sponsorship to complete interior restoration and internal furnishings'.
Much to the credit of Brno architect Jan Dvofiák, on 1 January 1995, the City of Brno appropriated funds for restoration of interiors of the Great Room. Now, after some 60 years passed when the villa was used by the Tugendhats, we can admire again Mies' concept of total design. And what more, the black and white photographic images of groups of the Barcelona, Tugendhat, Brno chairs and Mies coffee tables next to the onyx wall, the circular macassar ebony partition, the built in library shelves wall, once familiar to architects and published all over the world, can now be enjoyed in the original setting. The hues of the golden onyx wall and the dark brown macassar ebony have been enriched by the colors of the creme parchment, dark green cowhide, silvery gray Rodier fabric and ruby red velvet upholstery on the reflective cool of the tubular steel of the elegant modernist replica chairs manufactured to date. The design was prepared in consultation with the Brno Institute for Protection of Monuments and approved by the Museum of the City of Brno and the Division for Protection of Monuments of the Magistrate of the City of Brno. A landmark of modernism, Villa Tugendhat, when completely restored, is to be saved for the future generations. The administrator of the landmark museum is, since 21 June 1994, the Museum of the City of Brno. The Villa Tugendhat Fund has been founded in June 1993, in Brno, as a non–profit international assets corporation with the following aims:

- promote recognition of the Villa Tugendhat,
- concentrate gifts and donations,
- prepare the project of complete restoration,
- maintain the condition and use of this cultural landmark,
- promote recognition of avant–garde architecture of Brno.

Fund plans

In the near future there are two restoration phases planned. Restoration Phase Two includes the following aims:

- urgent reconstruction of the lower terrace and stair wall,
- urgent repair of roof and terrace leaks,
- repair of exterior stucco, painting of walls, columns, fence, etc.,
- reconstruction of the canvas awnings and window jalousies,
- reconstruction of windows to match original glazing, hardware,
- restoration of flooring and wall painting of interiors.

Restoration Phase Three involves:

- completion of missing pieces in the Great Room,
- restoration of the top floor interiors,
- restoration of bathrooms and kitchen fixtures and

The onyx wall in the Great Room sitting area, with a torso by Wilhelm Lehmbruck, after refurnishing with the white bench, the Barcelona chairs, the Tugendhat chairs and the 'X' glass coffee table. Photo: Peter Lizon, 1996.

surfaces,
- conversion of garage into admission office and bookstore,
- conversion of the laundry drying room into visitor video room,
- conversion of servant rooms into offices and archives.

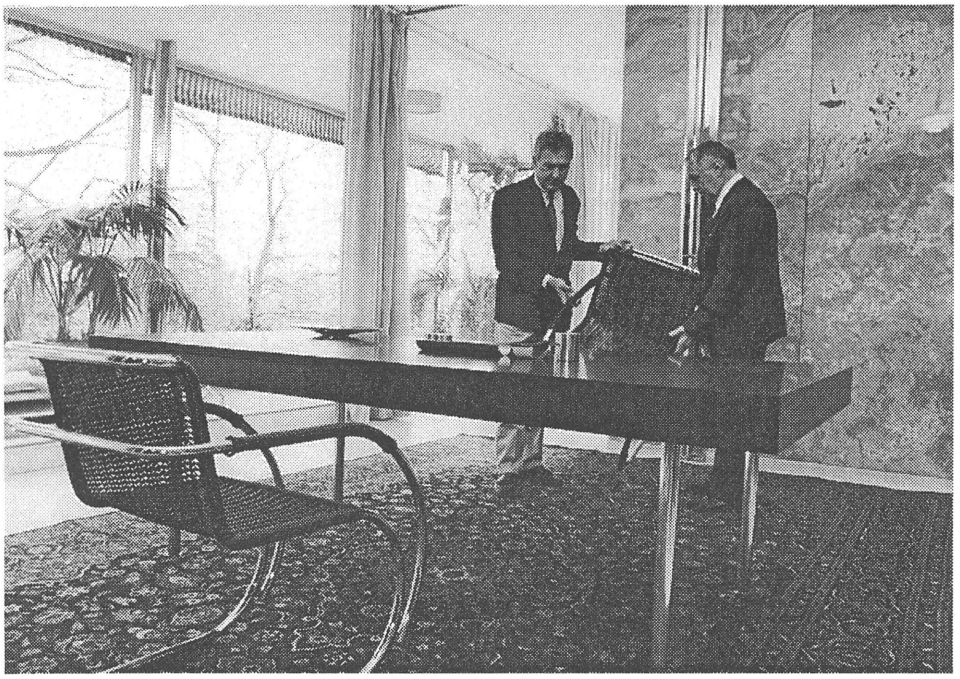
Museum Complex Plans:
- acquire and install the Villa Löw–Beer as the Museum of Brno avant–garde.
- design and build a Visitors Center to serve the Museum Complex of Villa Tugendhat and Museum of Brno avant–garde.

Through these restauration phases the Villa Tugendhat Fund intends to saveguard Mies' masterpiece as cultural heritage for the future generations.

Peter Lizon is a professor of architecture and member of the Villa Tugendhat Fund in Brno. This text is based on his book Villa Tugendhat in Brno – An International Landmark of Modernism *published by the University of Tennessee, College of Architecture and Planning.*

Chronology

1927 Fritz Tugendhat and fiancee Grete Weiss ask Ludwig Mies van der Rohe to design their house in Brno.



Great Room study area with macassar ebony desk and cantilevered rattan side arm chairs. New furniture installation by restoration architects, 1996.

1929 Construction work begins.
1930 The house is completed.
1938 The Tugendhats leave the villa to escape Nazi occupation.
1942 The villa becomes property of Nazi Germany.
1945 The villa suffers from war destruction and neglect, despite temporary repairs.
1950 Property is nationalized by the totalitarian government of Czecho–Slovakia.
1963 Successful campaign of Brno architects to grant the villa status of National Cultural Monument.
1969 National Council of Brno 'puts an end to the improper use of villa' and approves restoration. Retrospective exhibition of Mies' work, lecture of Grete Tugendhat and participation of Mies' office in Chicago in conference on villa restoration triggers resolution.
1972 Four original pieces of furniture are acquired and after restoration donated to the Moravian Gallery in Brno.
1983 Restoration of the villa begins.
1985 Restoration is completed, villa designated for VIP use is at disposal of the Brno mayor. Interiors are not part of the restoration.
1986 Exhibition on 1983–85 restoration, as well as a cover article in Architecture.
1987 Friends of Villa Tugendhat is founded in New York City with goal to restore villa interiors.
1991 AIA adopts, at a national convention Resolution W–1 on 'Continued Restoration Effort of the Villa Tugendhat'. Association of Villa Tugendhat (later named Villa Tugendhat Fund) founded.
1992 Talks on separation of Czecho–Slovakia are held in the villa between Czech prime minister Vaclav Klaus and Slovak premier Vladimir Meciar.
1993 Villa Tugendhat Fund chartered by City of Brno.
1994 Villa Tugendhat is designated a Landmark Museum, and opens to the public.
1995 City Council appropriates funds for restoration of Great Room.
1996 Opening of the restored Great Room at occasion of 110th jubilee of Mies' birth.

A little castle for a president

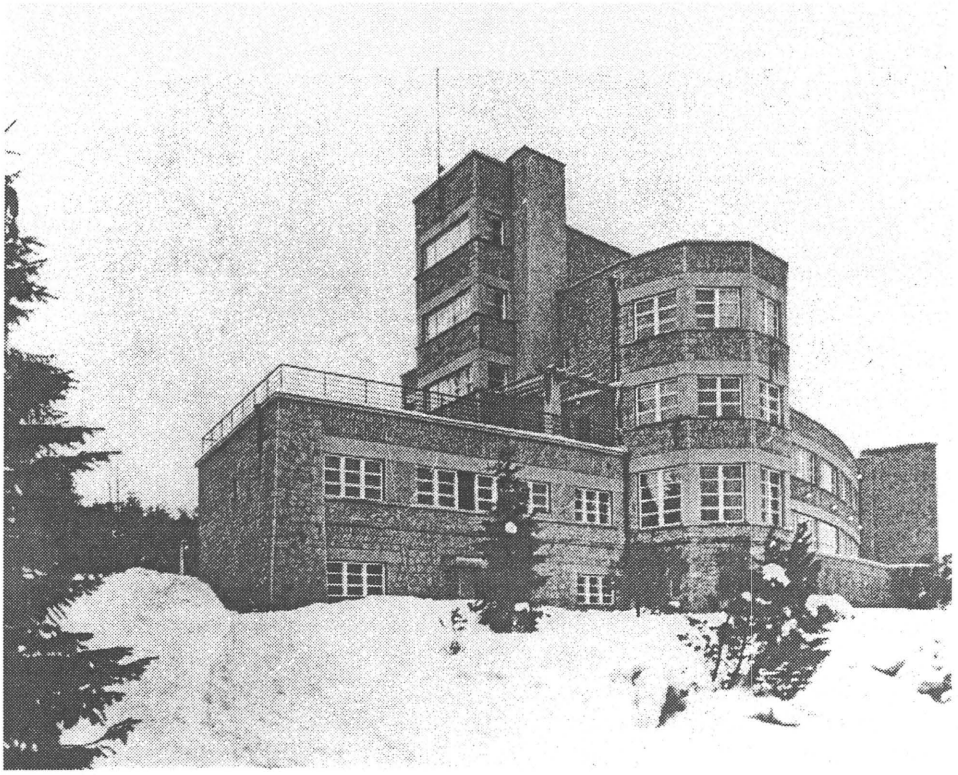
The Zameczek in Wisla, Poland

by Agnieszka Kulinska

The Zameczek residence in Wisla in Cieszyn Silesia was built for the president of Poland eight years before the Second World War, and still exists today. It was a gift from the Silesian district, when it became part of Poland after three consecutive uprisings against the German domination.
Adolf Szyszko–Bohusz, an architect and a professor at the Jagiellonian University and at the time supervising the restoration of the Wawel Royal Castle in Kraków, was chosen to design the prestigious edifice. The construction started in 1929 and was finished in December 1930, with the furnishing of the interior. In January 1931, the Polish president Ignacy Moscicki was able to spend his first holiday in Wisla.

Tradition and avant–garde

The choice of Szyszko–Bohusz as the architect was not a coincidence. At that time he was already a well–known and respected artist, who skilfully translated the qualities of earlier architecture into contemporary forms. His buildings often involve colonnades, portals or rusticated external claddings, and are based on symmetrical plans and sections.
The 'Zameczek', or 'little castle', seems to be a unique work, and is today considered as one of his best designs. The 'Zameczek' reflects the ideas and the formal tenets of the international modern avant–garde. At the same time, it seems to be completely Polish as well, representing its national art and architecture at an international level.
At that time the progressive artistic milieu in the revived, independent Poland was trying to define its attitude towards the new tendencies in European art, such as cubism, suprematism and futurism. Therefore the Polish avant–garde was interested in the artistic results of architects connected with groups like 'Blok' (1923–29) and 'Praesens' (1926–30), as well as 'formist' artists such as Józef Szanajca, Bohdan Lahert, Hallina and Szymon Syrkus.
Analyzing the architecture of the house, one can easily notice not only the influences of Le Corbusier, Dutch neo–plasticism and cubism, but most of all the creative synthesis, deeply rooted in the traditional conceptions of architecture, though in a very open minded way. The inspiration, which traces back to castles and palaces of times gone by, is of considerable importance here. The residence of one of the country's most important figures was to have a prestigious and representative character.
Designing the 'Zameczek' was being facilitated by its location: on the slope of a modified hill. In the past one could admire a wonderful view of the Barania Góra mountain region, a place with an almost symbolic meaning.



The president's holiday residence in Wisla features a modern lay out with traditional elements. Period photo.

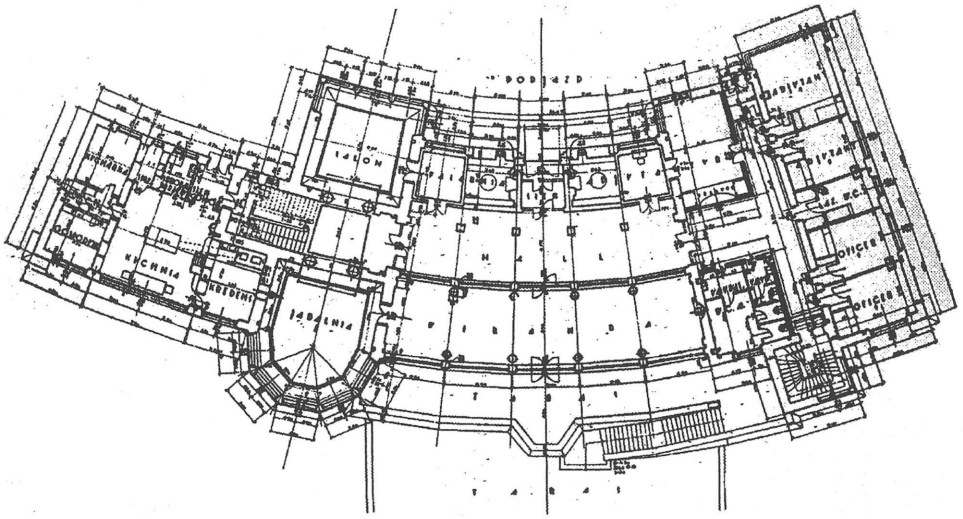
Interior and exterior

Although it is difficult to define the origin of the plan, it served as an example for the next thirty years. For Szyszko–Bohusz it was definitely a new and inspiring starting point.
The plans reveal the clarity and the simplicity of both

formal and functional principles. In the context of architectural history, one may notice the masterly work of the architect in the modern interpretation of castle towers and fortifications, adapted to the requirements of contemporary times. A wide central corridor functions as the artery of the ground level and, in a way, also as the spine of the house. The rooms for the president, his family and attendants can be entered straight from the corridor. On the ground floor the corridor passes into a hall, opening on to the terrace through a glass wall with doors. Such an interpenetration of outside and inside is characteristic for modernism.
The way the dining and the living room are separated by heavy curtains between octagonal columns instead of a traditional door reminds of Le Corbusier's concept of a free plan, which is typical for the early stages of modernism.
Also the innovative concepts of 'simultanism' can be traced in the design, where the simultaneous occurrence of phenomena derived from various styles determines new qualities of perception.
The early stages of modernism were characterized by the drive of the avant–garde towards the purist aesthetics of simple geometrical forms, giving architecture a universal value. In the 'Zameczek' this coincides with an attempt to maintain a national identity. The surface of the outer walls, with its stone cladding, remains within the paradigm of modern architecture to abandon ornamentation in favour of the even surface, as in Loos's slogan 'ornament is crime'. In view of all this, the fact that Szyszko–Bohusz introduced local sandstone as a building material for the castle somehow establishes a link between modern aesthetics and traditional construction.
The use of sandstone is also justified by practical reasons, since the cladding successfully resist the harmful influence of weathering, which is significant in an area that suffers the most intensive rainfalls of the country.
Another important aspect is the presence of a wooden chapel in the park close to the residence. It was built according to Witkacy's principles of the Zakopane–trend, propagating highlanders' architecture. The combination of chapel and castle enhances the contrast between avant–garde architecture for a modern user, and tradition, symbolizing what is eternal and permanent. On the other hand it shows the natural continuation of the past into the present.

Furniture

The interior of the 'Zameczek' was a joined effort with the painter Andrzej Pronaszko. The choice for this cubist with innovative ideas clearly proves that Szyszko–Bohusz wanted to distinguish himself from the Art Deco–style for interiors at that time. He considered the interior as a work of art which should be the consistent development of a comprehensive artistic idea; 'painting and architecture grew closer when artists realized that the laws of space, colour and material were inseparable'.[1] The initial idea was to divide the wall surfaces into wide geometrical planes coloured red, yellow and various shades of grey, as inspired by Dutch neoplasticism. If this design would have been carried out without any changes it would have been the first entirely modern interior in Poland, and one of the best examples of modernism. Instead, the building was successfully furnished with a set of entirely Polish–made, chrome plated tubular steel furniture, designed by the architect and manufactured by the Metal Products Factory Konrad Jarnuszkiewicz i Ska from Warsaw. The furniture features polished wood from a black pear tree and so-called 'anthelope' grey leather. Though the company was accused of copying foreign designs, the furniture was in accordance with Theo van Doesburg's 'architecture and all modern constructions; cars, aeroplanes and sleeping carriages in a train'[2] and created an atmosphere in which 'only the glitter of steel and noble surfaces of glass and polished wood inspired reflections about a new man and a new world filled with sunlight'.[3]

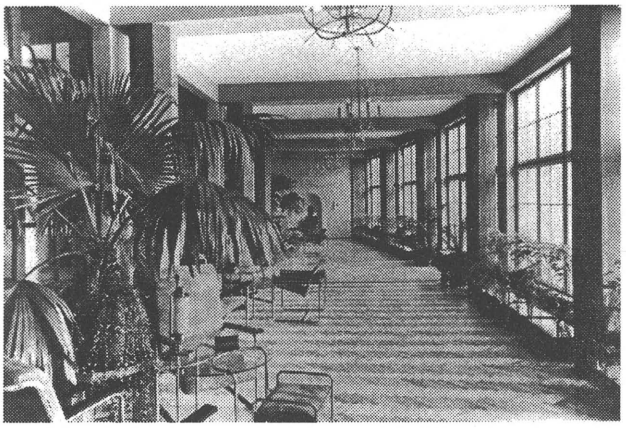


The ground floor plan shows the slightly curved hall as a spine for the building. Period photo.

Different heights

The exterior displays a 'chiaroscuro effect, almost like a sculpture' which creates 'an enormous richness of the profile, ever–changing when perceived from various perspectives'.[4] The architect proved that in order to create a modern, representative residence he did not have to refer to historic forms, which was very fashionable at that time. The elevations reveal the freedom of new means of expression.

The arrangement of horizontal and vertical elements is characteristic for the avantgarde buildings of that time, obtained by differentiation of heights between the main part of the building (one floor), and the side wings and towers (two floors in the north and four floors in the south). The verticality of the southern wing is accentuated by a chimney between the eastern wall of the staircase tower and a five–sided southern wing. This asymmetrical arrangement is balanced by the horizontal extension of a ribbon window while the simultaneous accentuation of window frames is again a traditional element, apparently inspired by the popular strip window introduced by J.J.P. Oud. The entrance portal in the western elevation is the only decorative element, still simple and elegant and thus attracting attention. Together with the Silesian eagle on top it remains entirely in harmony with the elevation. The sloped walls of the terraces all along the eastern elevation



The hall opens on to the terrace through large glass doors. The tubular steel furniture is Polish made. Period photo.

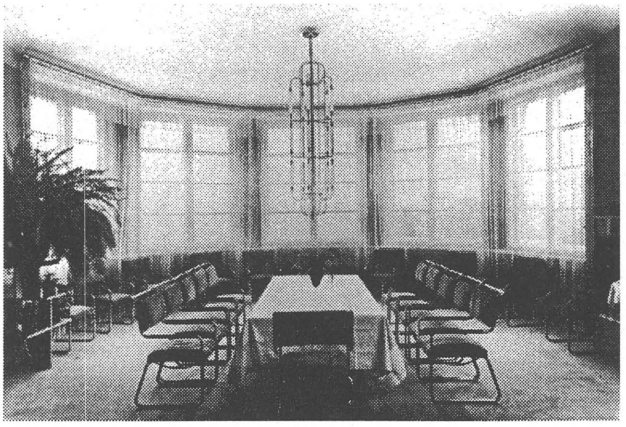
strengthen the monumental character of the building. Its name, being a diminutive, seems to be most accurate if one considers its scale and extensive use of glass which creates the impression of lightness and translucency, characteristic of holiday buildings.

In use as a holiday house for the nazis during the War, an entirely German, hipped roof was added to the building, which basically changed its form, in contrast with its characteristic horizontality. Still, the 'Zameczek' remains an important building in the development of contemporary Polish architecture and it should be protected as a representative of Polish culture of the interbellum period. Despite the owner's absence for over 50 years, the 'Zameczek' still deserves to serve the Polish head of state.

Agnieszka Kulinska is an assistant at the Institute of Architecture and Preservation of Monuments at the Kraków University of Technology, Poland. This article provides just an excerpt of the auther's research. A full text with endnotes can be obtained from the International Secretariat.

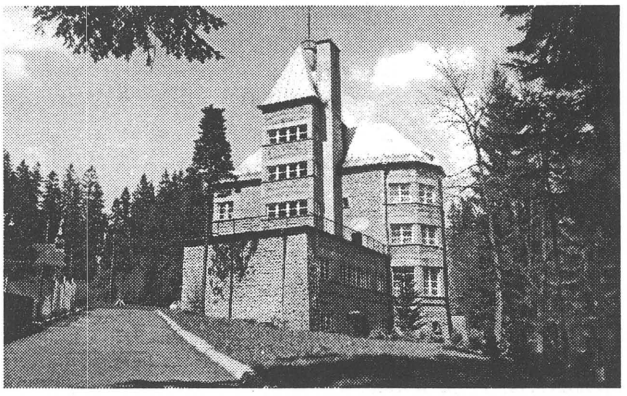
Notes:

1. H. Stazewski, 'Styl Wspolczesnosci' ('The Style of Contemporary Times'), Praesens, № 1, p. 2.
2. Theo van Doesburg, 'Ku Sztuce Elementów' ('Towards the Art of Elements'), Praesens, № 1, p. 3.
3. Stanislaw Swierz–Zalewski, 'Zameczek w Wisle' ('The Little Castle in Wisla'), Architektura i Budownictwo, 1931, p. 173.
4. S. Swierz–Zalewski, p. 165.



The dining hall with a remarkable set of furniture and light fittings. Period photo.

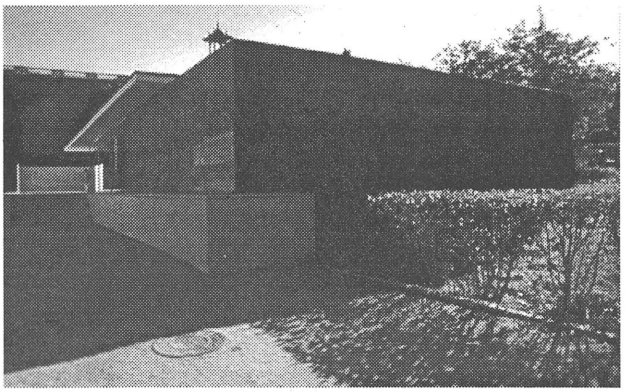
In use as a holiday retreat for nazi officials, hipped roofs were added during the war. Photo: Agnieszka Kulinska.



Barcelona Pavilion extension

Architectural competition

The architectural magazine *2G* is organizing a competition for young architects and architectural students, to design an extension for Mies van der Rohe's Barcelona Pavilion. The competition is sponsored by the editing house Gustavo Gili, with the support of the Fundació Mies van der Rohe and the Barcelona City Council.
The competition proposes as its design theme a building linked to the pavilion designed by Mies in 1929, to accommodate the offices of the Fundació Mies van der Rohe. The brief includes a multi–purpose hall, an auditorium, and a management, administration and archive area. The total built area is not to exceed 3000 m². The new structure should not impede or obstruct the integrity of the pavilion and should take into account the organization of the surrounding public space.
The jury will consist of Toyo Ito, president, Iñaki Abalos, Borja Carreres, Dennis Dollens, Kurt Forster, Gustavo Gili, Lluís Hortet, Josep Lluís Mateo, and Ignasi de Solà–Morales.
Participants may submit projects either individually or in groups, forming interdisciplinary teams, providing



The new extension should not obstruct the integrity of the Barcelona Pavilion. Photo: Wessel de Jonge

that at least one architect or architectural student is involved. All entrants must be under 40 years of age. Inscription fees are $ 60 for architects and $ 25 for students, awards are $ 10,000 first prize and $ 5,000 second prize. Five special mentions will be entitled to a year's free subscription to *2G*.
Final deadlines are for inscription 14:00 PM on October 31, 1997, in Barcelona, for queries December 31, for submission of projects March 31, 1998. The results of the competition will be published on September 15, 1998.

More information from Editorial Gustavo Gili, SA, Rosselló 87–89, 08029 Barcelona, Spain, tel. +34–3–4305435, fax. +34–3–4304653, e–mail: 2Gcompetition@seker.es.

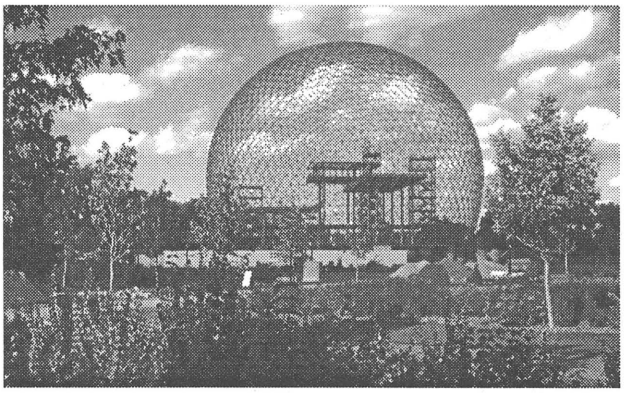
The Art of the Engineer

Exhibition and Catalogue

Centre George Pompidou; 25 June–29 September 1997; catalogue 600 p., 700 ill., $ 85,–

The world of engineering has been the subject of several international exhibitions over the past few decades, but it is particularly appropriate that the Centre George Pompidou, whose very design was the fruit of an extremely close collaboration between engineers and architects, should mark its 20th Anniversary with a vast retrospective devoted to the mayor projects carried out by building engineers since the mid–19th Century.

Our perception of architecture has been shaped by the works of the engineers of the great structures that have become touchstones for the 20th Century. Since the Industrial Revolution, technical prowess, economy of materials and means, and the intelligence of technological interventions have given engineers real control over architectural expression. Their works have invented lightness and transparency, the images of today's world and the way we look at it. Unlike the



Buckminster Fuller's dome of the US Pavilion for the Expo 67 in Montreal. Photo: Wessel de Jonge

tradition and powers of 'proportion' vaunted by architects, the engineers opted for boldness and novelty. Within such a positive, progressive vision, this heroic dimension implies a kind of ephemeral performance, constantly surpassed by new experiences, as the ultimate goal. The world of objects that results can then be produced and judged according to criteria of technological beauty, that leave no place for historicism or individual taste.

The exhibition features works that have been created according to this premise. The presentation is oriented to the use of materials, the fabrication of the work, the evolution of the construction, steps that are probably more important to the engineer than the finished work. It is the works in progress rather than

the finished products that provides the focus of the exhibition. Most presentations therefore feature information on construction procedures showing successive stages of construction.

The issues of great industrial transformations, the spread of materials, and technical invention underlie the four sections of the exhibit: Iron, Reinforced Concrete, Light Structures, which are all obvious themes in the context of the exhibition, and Current Issues, that involve the appearance of new materials, the spread of computer simulation, the development of hybrid structures, and other techniques dealing with today's key issues in engineering like environment, energy performance, and comfort.

The architecture of the exhibition reflects the visual experience of the great 19th and 20th Century exhibition halls. The Centre Pompidou was profoundly influenced by the basic scheme of the Crystal Palace, as regards the great length and repetition, the transparency, and the vast spaces, that are echoed in the display of works on identical, low, translucent tables that eliminate any traditional form of separations. The only elements present are the space itself –a building of a great engineer, Peter Rice– and the force of the objects that are suspended from its construction. The works themselves are architectural; a Buckminster Fuller dome, the Dymaxion car, components of Jean Prouvé's Aluminium Centenary Pavilion (see *Journal 12*, pp. 60, 63), an airplane from the early 20th Century. Large scale engineering works like bridges are presented as giant moving images projected floor to ceiling on the inside of the envelope of the Centre, to emphasize their vastness.

Together with the exhibition the Editorial Department of the Center Pompidou published a 'dictionary of engineers', that includes contributions from over 100 international authors –architects, engineers, and historians– and presents an encyclopedia of all great engineers and their works, albeit with a focus on France and the French speaking world, ignoring such innovative engineers like the Argentine José Luis Delpini (see pp. 33,38).

The catalogue has 600 pages and about 700 illustrations and costs about $ 85,–. It is a fantastic reference work that constitutes a standard for the coming decades regarding innovative engineering in the last two centuries. For those who are not professionally involved, or have less to spend, a 'Petit Journal de l'exposition' is available for less than $ 5,– that provides an excellent insight in the world of engineering to the public at large.

The exhibition provides a very appropriate conclusion to the first two decades of the Centre's vigorous life, since the building will be closed for extensive renovation works this October.-WdJ

Preserving modern windows

3rd DOCOMOMO Technology Seminar TU Eindhoven, January 27, 1998

The built heritage of the Modern Movement is today more at risk than that of any other period, due to its age, the functions it was designed to perform, and the present cultural climate, but most of all because of the involvement of often innovative technology. New materials and construction types, and standardized building methods have been instrumental in materializing modernity in architecture. Constructions and envelopes were pushed to their physical limits, and were often designed with a limited lifespan. DOCOMOMO aims to foster the development of appropriate techniques and methods of conservation, and to disseminate this knowledge. Yearly international seminars on modern conservation technology are organized to produce a series of professional Preservation Technology Dossiers, focussing on the preservation challenges posed by modern features such as structural frames, exposed architectural concrete, glazings, steel windows, light envelopes and curtain walls. To date two such seminars have taken place, and a third is scheduled for next January.

Windows and glass

The traditional window was transformed into an emblematic feature of Modern Movement architecture as a symbol of the permeability of the skin, that allows to cross the borderline between inside and outside, both virtually and physically. At the same time windows –and facade systems in general– are amongst the most vulnerable components of modern buildings, and not only because of the minimalist aesthetics that called for minimalist dimensions. Windows are easily subjected to change when buildings are renovated, either for functional reasons, to transform the image of a building, or to alter the technical characteristics regarding thermal, hygrical or acoustical performance. Such changes commonly concern the replacement of the window frames by products made of another material –like PVC instead of wood or aluminium instead of steel– but often involve just as well a change of dimensions to accommodate insulation glass and to improve the overall physical performance, or new types of glass with coloured and reflective coatings to meet energy performance standards.
With the appreciation of MoMo buildings on the rise the need for appropriate conservation techniques and replacement products has become critical. On January 27, 1998, the Third International Technology Seminar will focus on the preservation and replacement of modern windows and glazings. Papers from international experts will address key issues regarding repair and replacement of steel and

wooden windows, and replacement glazing. International case studies will present examples of window and glass replacement in modern buildings to illustrate that an improvement of performance does not necessarily imply a significant change of the architectural characteristics.

Discount for members
The Seminar is being organized by the DOCOMOMO International Secretariat in coordination with the ISC/T and the TU Eindhoven. The full day program will include about five general papers before lunch and the same amount of case studies in the afternoon, followed by questions and debate. The costs will be about Dfl. 475.— per person, lunch included, with a Dfl. 100.— discount for international members. There will be a special student fee of Dfl. 25.—.
A program brochure is due for November and can be obtained from the International Secretariat. For more information, visit our homepage at www.ooo.nl/docomomo, or contact DOCOMOMO International.

DoCoMeMo's

• **Le Corbusier** - A CD-ROM on the work of Le Corbusier has been compiled by *Infinitum* publications. It includes descriptions of some 200 projects, extracts of films related to specific projects, drawings, paintings, sculptures, etc. and also a biography section with correspondence and writings. Produced in association with the Le Corbusier Foundation, this authorative document presents for the first time, in a single format, a significant selection of approximately 3000 images showing the multidisciplinary nature of le Corbusier's most famous as well as lesser known works. This work draws upon an archive of 550,000 items bequested by the architect to the Le Corbusier Foundation and is devised to provide the researcher with exhaustive reference material.
Specifically targeted to the professional and academic market, this product is also addressed to anyone with a general interest in art, design and architecture. Further information on the Internet: www.infinitum-publications.fr.
• **Less is more** - The Association for Preservation Technology (APT) will hold its 29th annual conference in Chicago from September 25 to 28, 1997. The conference theme, 'Less is more', focusses on the concept of doing more in the field of preservation technology with less: realizing maximum results with limited resources, achieving long-term preservation with minimum intervention and working more effectively with less flexible regulations. Chicago will serve as a hands-on laboratory offering everything from mid-19th Century steel plants to modern highrises, from historic railroad manufacturing facilities to designed landscapes and residential communities, and from notable lobbies and light courts to celebrated outdoor sculpture. More information from APT 97, c/o Building Research Council, One East St. Mary's Road, Champaign IL 61820, USA, tel. +1-217-3334698, fax +1-217-2442204, e-mail w-rose@uiuc.edu.
• **Photo competition** - To celebrate the World Heritage Convention, which was agreed upon 25 years ago, UNESCO (together with Agfa and Lufthansa) is now promoting the World Heritage Photo Competition. The task is to photograph one of the 506 World Heritage sites (which includes the Bauhaus, Brasilia and the Stockholm Forest Cemetery) from a very individual point of view.
This competition is open to all those who like photography, and runs until October 1, 1997. Conditions of entry can be found on the Internet: www.agfaphoto.com/wh. After the competition the winning pictures will be on display at this site as well.
• **Rebuilding Memory** - From November 6 to 9, 1997, the Architects Association of Logroño and The Architectural Heritage Service of the Barcelona Country Council are organizing the 9th Conference

on Intervention in the Historic-Artistic Heritage, entitled *Reconstruir la Memoria* (Rebuilding Memory). More information from the Architectural Heritage Service of the Country Council, Comte d'Urgell 187, 08036 Barcelona, Spain, tel. +34-3-4022173, fax +34-3-4022490.

• **Hilding Ekelund** - An influential figure in Finnish architecture (housing, public buildings, town planning but also education), Hilding Ekelund's career spanned over several decades, from the Nordic classicism of the 1920s to the late modernism of the 1970s. To him, the function of architecture was to create environments which enhance possibilities for a good life in everyday routine as well as festivities, in all kinds of buildings. The book *Hilding Ekelund 1893-1984, Arkkitehti-Arkitekt-Architect*, published in connection with an exhibition in early 1997, is a comprehensive survey of his life's work. Edited by Timo Tuomi, Kristiina Paatero and Eija Rauske with texts in Finnish, Swedish and English, and available at FIM 290.—; ISBN 951-9229-95-7. Orders can be send to the Museum of Finnish Architecture Bookshop, Kasarmikatu 24, 00130 Helsinki, Finland.

• **Alvar Aalto** - In honour of the 100th anniversary of Finland's most prominent architect Alvar Aalto, an exhibition will be opened on February 4, 1998, at the Kunsthalle in Helsinki. This exhibition is a profound survey of a few key buildings from a new angle, partly based on new research outcome. The selection is based on the idea of a total work of art: besides architecture, Aalto's furniture and other designs will also be presented.
The catalogue (by Riitta Nikula and Jussi Rautsi, a former employee of Aalto) will feature recent research outcomes, describing the different phases of building, starting from the design process. For inquiries, contact the Museum of Finnish Architecture (see address above).

• **Cineac** - After a long-lasting debate on what to do with this declining masterpiece (see also *Journal 13*, p. 5), the former newsreel cinema 'Cineac' by Johannes Duiker was re-opened in Amsterdam on November 13 last year as 'Planet Hollywood'. This successful chain of restaurants, co-owned by several movie stars, has its own concept which includes a dining room decorated with movie memorabilia and zebra prints on the wall. The stylish and sober exterior has been restored respectfully, but forms a violent contrast to the multi-coloured interior. One could say that Duiker's spirit was preserved on the outside and completely lost on the inside. The Cineac/Planet Hollywood is located in the center of Amsterdam, Reguliersbreestraat 31-33.

• **Berlage's museum** - After 60 years, Berlage's Gemeentemuseum in The Hague, the Netherlands, was in need of an overhaul, which is currently being carried out by the architect's firm Braaksma & Roos. Besides restoring technical defects, the building will also be altered in order to make optimal use of the museum's rooms. New parts will be added, amongst others to display the museum's collection of historic costumes. However, it was stated that the monumental qualities of the building will be the main concern of the restoration.

• **Weißenhof exhibition for sale** - The Architecture Gallery at the Weißenhof Siedlung produced a poster presentation on this famous exhibition estate in Stuttgart, Germany. It consists of 33 posters 1.00 x 0.70 m. and comes with a brochure in english, italian, french, spanish or german, including texts, photographs and drawings explaining on the history, the architects and the restoration. The exhibition is for sale at DM 2,000.—. Renting is not possible.

• **Dammerstock Siedlung** - Until September 7, the Karlsruhe Museum beim Markt shows the exhibition *Neues Bauen der 20er Jahre* presenting the Dammerstock Siedlung in Karlsruhe and the involvement of architects Gropius, Haesler, and Schwitters in the establishment of this social housing area, that involves a number of experiments in concrete contructions. A catalogue is available for DM 45.—, Karl-Friedrich Strasse 6, Karlsruhe, tel. + 49 - 721 - 9266494.

• **Mart Stam** - The Deutsches Architekturmuseum in Frankfurt published a comprehensive catalogue of the Mart Stam archives, that are kept today by the DAM. To celebrate the publication, a small exhibition 'Mart Stam, Architekt, Visionär, Gestalter' was on show until 7 September, involving many original photographs and magazines featuring Stam's works, some furniture and new models, mostly of urban schemes. The publication is available for DM 68.— from the DAM, Schaumainkai 43, Frankfurt am Main, tel. + 49 - 69 - 21238471.

• **Brazil House** -The Brazil House in Paris, designed by Lucio Costa and Le Corbusier in 1953-59, now featuring the students hall of the Fondation Franco-Brazil, had to be closed last June 30rd due to the bad condition of the building. It is unclear if the two goverments are able to raise sufficient funding for the urgent repairs to saveguard this important building. Encouraging is that the Brazilian press published critical articles after it became clear that the building might be lost altogether, that seemed to have stirred federal authorities in Brazil.

• **Aluminium Pavilion** - Parts of Jean Prouvé's Aluminium Centenary Pavilion of 1953-54 has been on show this summer as a part of the large exhibition on Engineers Art in Centre Pompidou, Paris. The building was taken apart on site in Lille to make place for 'Euralille' some years ago and has been hidden in some warehouse since then (see *Journal 12).*
In this renewed tribute to Prouvé's work the shown components already present a remarkably archeological flavour, despite the restoration they have undergone for the occasion. May be this exhibition will stimulate the French authorities to develop a more useful purpose again for this remarkable building.

Reports

Brazil: second national seminar

DOCOMOMO Brazil received the pleasant notice that our proposal for the organization of the International DOCOMOMO Conference in the year 2000 in Brasília was accepted. We are very aware of the innovative features of the future meeting: it will be the first encounter of this network outside the old continent, in a country of particularly strong contrasts, within its new capital: an emblematic worldwide MoMo intervention. As the Conference will be carried out by two main institutions: the Federal University of Bahia (where DOCOMOMO Brazil has its headquarters) and the Federal University of Brasília, we have began to work on our joined responsibilities, taking advantage of the more than sufficient period of time to arrange for the organization, and keeping in mind as well that anticipating a little bit the whole schedule will help to avoid any communication problems due to our distance from most working parties.
This June we have distributed our second bulletin to our members and to all national working parties. The main content is about the last Conference held in Slovakia, and the decisions taken, with a specific text dedicated to the ISC/Urbanism, Landscape and Gardens.
The next big challenge of DOCOMOMO Brazil will be between 10 and 12 September, when we will be organizing our second Brazilian DOCOMOMO Seminar. The call for papers has been sent and the contributions are expected to arrive by 30th June. The three main thematic points are: Architecture, Public Space and Social Project (aiming a preparation for discussions in Stockholm); Art and Technique: possibilities of new formulations in the fields of architecture and urbanism; and Contemporary Interventions in Modern Architecture and Urbanism: conceptual, political and operational limits of preservation.

Report by Angela West Pedrão, vice–coordinator DOCOMOMO Brazil.

France: focus on postwar heritage

The French section of DOCOMOMO published the second edition of their national bulletin. The publication of the first edition triggered substantial response from the professions and therefore, the French group intends to publish an edition of the bulletin every three months if financial resources will permit this.
As part of the DOCOMOMO International Register project, in which their section actively participates since 1993, the French register now includes over 90 private or public buildings, but just as well works of art and urban ensembles, and from the 1897 Castel Béranger by Guimard up to contemporary works. Apart from its national importance as valuable documentation, the French chapter of the register allows them to develop a better understanding of their built heritage, and provides suggestions for protection under Monuments Historique, their national Department for Conservation.
Further to this, the French working party has started a common research project with the Association Friends of Prouvé AMAL on the built heritage constructed in France between 1945 and 1975. Observing that the architecture of the second half of the 20th Century is at great risk, is not very well known, and insufficiently protected, this study should allow to identify which of these buildings are of real architectural interest and promote recognition of these structures. The research, which is supported by the Direction de l'Architecture, is also aimed at assessing the cultural value of such buildings in view of a possible future designation as cultural heritage.
Perret's famous building for the national Economical and Social Council will serve as the backdrop for a national debate on 20th Century Architecture as Protected Patrimony on November 13 and 14. Staged by l'École Nationale du Patrimoine, this location was chosen because of the vigorous polemic that is going on about the projected extension by architect Gilles Bouchez. An exhibition on the same subject is on show until December 15 at the Assemblée Nationale in Paris.
Another exhibition is being scheduled for the coming winter, dedicated to the architect Jean Bossu (1912–1983). As a former collaborator of Perret, Lurçat, and Le Corbusier, Bossu was one of the postwar architects who successfully developed a synthesis between vernacular architecture, local circumstances and the issues raised by the Modern Movement. He has been active in the Reconstruction period (at Bosquel in the Somme region), later in the Reunion period and finally in Algeria until 1970. He was one of the founders of l'École d'architecture de Paris–La Défence and for this reason, the school decided to have the exhibition prepared, in collaboration with the IFA, trustee of the Bossu fund, and the University of Paris 1. Xavier Dousson, preparing a PhD on Bossu at that university, is in charge of the project.

Report excerpted by the editor from texts by various authors in the 2nd DOCOMOMO France bulletin.

Italy: first conference prepared

The Italian DOCOMOMO Working party published another issue of their 'Giornale', announcing a first DOCOMOMO Italia Conference scheduled for this winter in Rome. The idea is to establish a series of such national DOCOMOMO conferences in the years between international DOCOMOMO conferences, to solicit debate on the theoretical and practical issues related to the preservation of modern architecture. This first conference will address the relation between documentation and conservation practice, in the specific context of modern architecture in Italy.
The two-day conference will consist of three sessions, dedicated to Documentation and Conservation of Modern Architecture, Modern Construction in Italy, and Techniques for Diagnose and Intervention of Modern Buildings. The first session will involve invited speakers, while the second and third session will include selected papers, introduced by a key note lecture. The conference will be concluded by a round table debate.
The meeting is aimed at historians, architects, engineers, technical consultants, owners, contractors and executives in the building industry. The working language is Italian. The conference will take place in December or January. A full post-conference book will be published in 1998.

Report based on DOCOMOMO Italia 'Info Convegno', translated by the editor.

The Netherlands: continuing story of Van Nelle

It seems that the Faculty of Architecture of Delft University of Technology has proposed to move to the Van Nelle factory in Rotterdam, in an attempt to cope with its housing problems. The faculty has outgrown its current facilities, urging a number of departments to move to other locations, scattered all over Delft. This new function, if combined with other educational or cultural institutions, could fit very well in the buildings and the somewhat remote location of Van Nelle. Anyway, it is the best idea to be proposed as yet. It is said that the municipalities of Delft and Rotterdam are willing to support this move, but the Board of Delft University still opposes, fearing negative effects of the dislocation. It is a good thing that with this idea the reuse of Van Nelle is on the way to become a political issue: that means the discussion will be out in the open and the architectural, or better cultural interest will get the attention and the fair chance it needs. We will keep you informed.

There seems to be no hope for the 1964 academy building by architects Maaskant, Dommelen & Kroos in Tilburg. The complex has to make place for new residential development and the municipality of Tilburg, usually know to be architectureminded, doesn't seem to be willing to list the building for protection or even look into the possibility of giving it a new function within the framework of the redevelopment of this part of the city. DOCOMOMO NL has sent an appeal to the Mayor, but hasn't received an answer yet. We fear another example of the increasing corrosion of our postwar MoMo heritage.

Report by Rob Docter, coordinator of the Netherlands DOCOMOMO Foundation.

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A miracle material
The abstract expression of concrete

We see, hear, smell, feel and taste the qualities of the materials which surround us. But emotions and ideas are also part of our reality, whether virtual or tangible. Every specific material is made up of matter, and matter is also the means by which we express ourselves when we create new objects and a new environment. We describe its properties and allow ourselves to be affected by its qualities. From this defined matter, specific materials with particular characteristics are derived.
Concrete is the material of change, of metamorphosis. Like a chameleon it appears in different guises and in different connections. The assessments of this substance have changed over the years. In the early modern period, it has been considered a miracle material which would solve all the problems of the building industry. Later it was seen as representing the inhuman scale of large building projects, sharply criticized by the postmodernists.
In many ways concrete is as well a universal material. It can take any form and shape, and it is made up of raw materials which are so commonly found that they can be extracted and produced virtually anywhere. Still concrete represents particular values that are hard to define but, at the same time, seem to be identified with modernity in architecture by many. Is concrete *modern*?

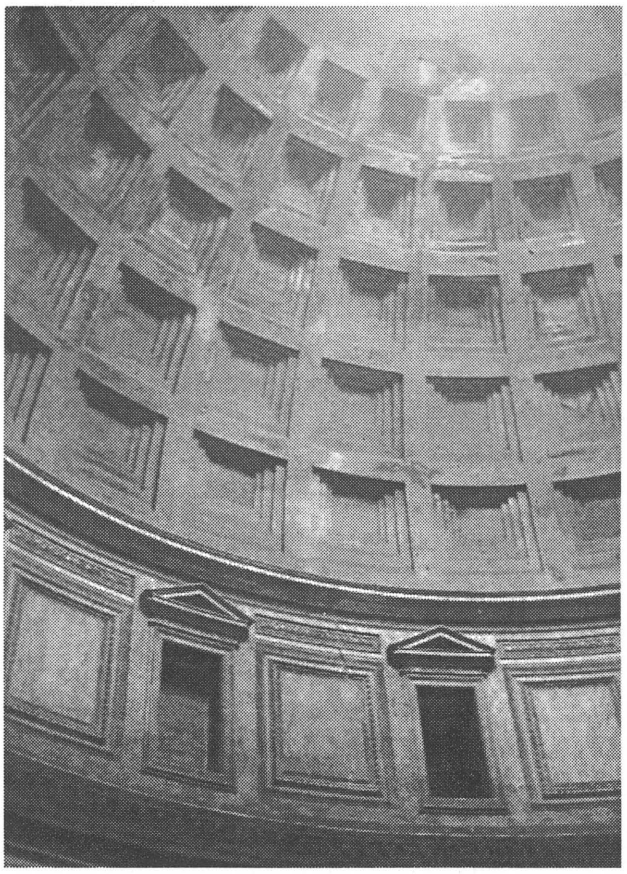
by Ola Wedebrunn

Since ancient times clay, plaster, and lime have been used in making stone walls. The first cast walls were erected in Greece as early as the 3rd Century B.C., but it were the Romans who developed the concrete of antiquity. Roman concrete was a mix of lime and volcanic pozzolana sand. It got its name from the village of Pozzuoli, which was situated on the slopes of Mount Vesuvius. The pozzolana had been spewed out from the glowing mass of fire inside the volcano. 'The fire and the heat of the flames, which emerge from inside the mountain through the cracks, make the soil light, and the tufa that is found there is porous and free from moisture. When lime, pozzolana, and tufa, all created in the same way by the fire, are mixed, they merge with the help of water, and the moisture causes them to harden rapidly into a substance which can neither be dissolved by waves or water.' This is how the Roman architect Vitruvius in the age of Emperor Augustus described the unique properties of pozzolana. In combination with lime and water it cures, turning into Roman concrete, as strong and durable as the best concrete produced today. Concrete was used more and more in the construction work of the Roman Empire, in aqueducts, docks and ports, baths and so on. When Nero had Rome rebuilt after the Great Fire in 64 A.D., the innovative concrete technology made for a new architecture. By casting huge domes and vaults in concrete, builders in Nero's time lay the foundation for a new concept of space, celebrating the mutual relationship between the shape of the space and the material qualities of concrete.
Fire burnt the soil to produce the raw material; combined with water the material took shape of structures which occupied space and, hence, air. Implicitly, pozzolana was connected with the four elements indeed.
However, Roman concrete never had a direct visual expression. The Romans either lined their concrete structures with rough stones or cast the concrete in a cavity between brick or stone walls. But even if concrete was hidden behind stucco, rough stones and terracotta, the use of concrete was a prerequisite for large span vaults and domes and a free use of space.

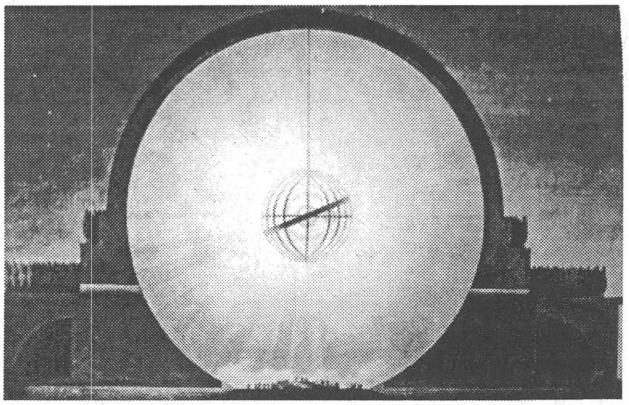
Modern concrete
By means of pencil and paper there is hardly any limitation in creating form and shape as long as only two dimensions are considered. Yet, in the past, many projects never got beyond the drawing board because no material could share the boundlessness of a design on paper. In the late 18th Century, French architects for instance designed ideal projects on a utopian scale. Large concrete structures like the

Pantheon gave evidence of the technology and the materials which the Romans had once mastered, and they were an inspiration to many architects. Still, the giant dome of Étienne–Louis Boullée's monument for Isaac Newton (1784) seemed to be too large to be realized in any material or any construction at that time. It was not until the 20th Century that technological advances created actual opportunities for building projects the size of the Newton memorial. However, the required material was already available in Boullée's time. The English engineer John Smeaton had been a pioneer in analyzing the properties of pozzolana. He made use of these findings in constructing a lighthouse at Eddystone off the south coast of England, using water resistant Roman cement consisting of pozzolana and lime to join the stone blocks. But Smeaton's concrete was dependent on the presence of natural volcanic soil, and it was only by burning lime and mixtures of clay at a temperature of about 1500 degrees Celcius that the Englishman John Aspdin was able to take out a patent for the production of synthetic concrete under the label Portland Cement in 1824. What used to be brought forth by volcanoes could now be produced anywhere in the huge kilns of the industrial age.
This was also the case with iron, a second prerequisite for the development of concrete technology. In the 19th Century both materials were used in the construction of buildings. The first skyscrapers and the Eiffel tower were constructions made exclusively of steel, while concrete was commonly used for construction work such as harbours and fortifications, and as artificial stone for instance in facade ornamentation. But when iron was first used to reinforce concrete, a completely new material had been created. As iron has great resistance to traction and concrete can resist high compression, together the two materials contracted a successful alliance, in which the alkalinity of concrete also protected iron against corrosion.
The Frenchmen Lambot and Monier were among the pioneers of the new material in the mid 19th Century. They each constructed rowing boats and flower pots, among other things, by moulding concrete around steel mesh. It was, however, the engineer François Hennebique who was to develop the essential knowledge of the constructive powers of reinforced concrete. By determining the position and the dimensions of the reinforcements he also lay the foundations for a mathematically controlled use of reinforced concrete. Roman concrete borrowed from long term experiences in practice, while Smeaton's scientific analyses has paved the way for today's concrete. The first entirely artificial concrete was produced by Aspdin, and, finally, when the reinforcement of concrete was introduced by the French, a building material emerged with properties that were new and challenging.

The Pantheon in Rome is among the best preserved structures of ancient concrete. All photo's by courtesy of Ola Wedebrunn.



Boullée's monument for Newton seemed too large to build in 1784.



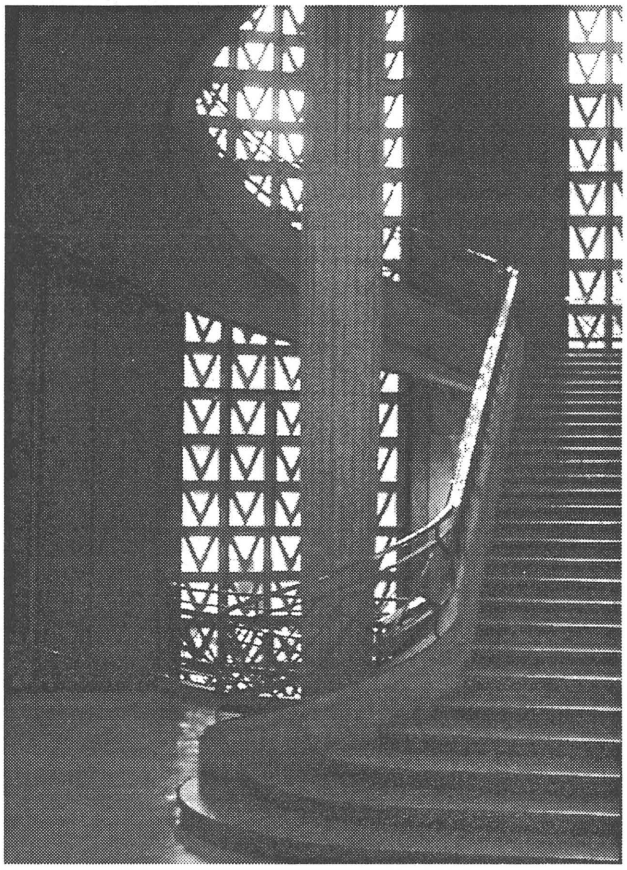
Today, concrete is produced through standardized industrial processes. It is either prefabricated in simple and more sophisticated shapes for structural components, or cast *in situ* for particular solutions in representative and monumental buildings with great sculptural qualities, such as the Sydney Opera House by the Danish architect Jørn Utzon (1957) or the bridges and halls by the Spanish engineer and architect Santiago Calatrava. Concrete is now applied in a variety of forms, from free and organic to the mathematically computed bold and slender shapes that characterize current civil constructions. The uses to which concrete can be put are as different as night and day – either to create heavy and

essentially dark volumes or thin and taut concrete sails of airy structures soaring towards the sky.

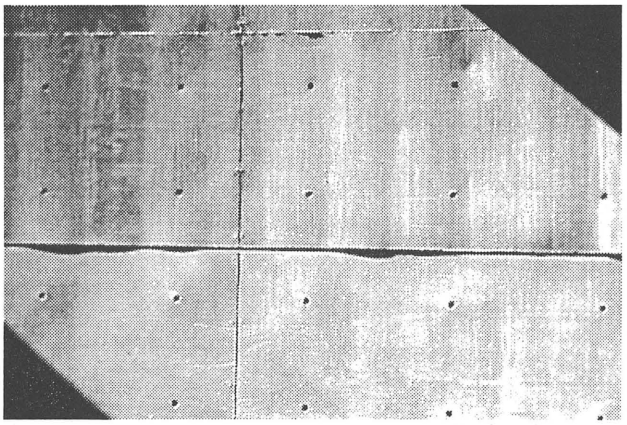
Surface and meaning

To stress an ideal geometry, the late 18th Century architects designed buildings with homogeneous facades in stucco or stone within a close colour range. The role of the material was to emphasize the entirety of the surface as much as possible.
To the Modern Movement the integrity and purity of surfaces represented also their ideals regarding the relation between appearance and contents. In the catalogue to the 1932 exhibition 'The International Style', Henry Russell Hitchcock and Philip Johnson write: 'The ubiquitous stucco, which still serves as the hall–mark of the contemporary style, has the aesthetic advantage of forming a continuous even covering. But if the stucco is rough, the sharpness of the design, which facilitates apprehension of the building's volume, is blunted. Rough stucco, because of its texture and because it recalls the stucco–covered buildings of the past, is likely to suggest mass.'[1]
However, in modern architecture stucco and concrete were not exclusively used with an even surface, as is illustrated for instance by the rich variety of textures in the works of the French architect Auguste Perret. In the early 20th Century Perret contributed enormously to the acceptance of concrete as an architectural material, in a structural sense as well as in terms of aesthetics. He added a new value to concrete as a construction material by introducing the concrete frame with his 1903 Rue Franklin apartments in Paris, creating the preconditions of the *free plan*. At the same time, he transformed the image of concrete from a rough material with clear board marks left by shuttering, to a sophisticated construction element that could be produced as precast blocks and beautifully cut and textured. Perret used concrete in the same way as the finest natural stone, dressed by hammer and chisel to produce a pleasant and expressive surface. As an apprentice with Perret Le Corbusier learned about concrete from his master, and when he started his own enterprise under the name 'Ch.–E. Jeanneret architecte Béton Armé', this was no coincidence.
Still, the even surface remains emblematic for early modern architecture, and it was only from the mid 1930s onwards that textural contrast, for instance between concrete and natural stone, became an important parameter in architectural expression. In the 1950s the sculptural articulation of concrete became increasingly apparent, as well as the expressiveness of the material itself. Rough unfinished concrete that displayed a casual pattern of the boards that had made up the formwork later became a hallmark of an architectural style in its own right called 'New Brutalism', characterized by an uncompromising and at best honest architecture.

Perret's works in dressed concrete mark the maturation of this modern material.



Spacers of the formwork remain visible in the concrete walls of Tadao Ando's works.



Le Corbusier labelled the rough concrete surfaces *béton brût*, and in the 1950s he used the technique of the casual board patterns and rough coarse aggregates in several apartment blocks as well as representative buildings.
The storm of criticism of the uncompromising character of late modernism, as well as the demand for energy efficiency, fueled the tendency towards decorative claddings evinced by postmodernism. The connection between construction and contents was mostly lost with a veneer of brick, wood or metal merely becoming a fashionable appearance of what is essentially a concrete construction. By referring to

new values which allow gratuitous ornamentation and an undeveloped building technique, the disconnection between construction and expression might even be justified.
Could it be that a material link was lost in the criticism of the '
brutal' but honest articulation of late modernism?
Largely dating from the same period, the works of the Japanese architect Tadao Ando on the other hand show a plain connection between surface, expression and contents, particularly in the bare concrete walls of most of his buildings. The spacers connecting the formwork panels in between which the concrete is poured are a common feature in concrete technology, but remain visible in Ando's unfinished walls. The holes that held the spacing pins and the marks of the fixings and clamps are telling the story of how the wall was constructed and lend the surface a sense of scale and proportion at the same time.

Surface and time

Cement is a main ingredient of concrete. This bonding agent is essentially a powdered mixture of lime and silicates. With water, cement produces a slurry that can then be mixed with sand and various aggregates such as stone and gravel. If concrete is left bare the surface is typically cementicious, since the fine grain of cement causes the aggregates to be completely covered with a cement film. Changing the colour of the cement from standard grey to white, or by using additional pigments, will therefore have a strong influence on the appearance of bare concrete.

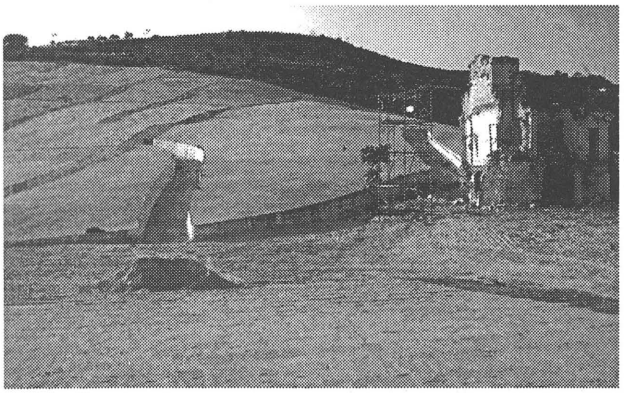
Concrete constructions as dissolving ribbons in a mosque in Rome by Paolo Portoghesi, 1989.

Another way of colouring is to use coloured aggregates, which is particularly effective if the cementicious skin is removed.
A very subtle example of colouring is the use of white cement and crushed white marble as an aggregate, which results in a beautiful white concrete. The Bagsværd Church outside Copenhagen, designed by the Danish architect Jørn Utzon in 1973–76, is an example where such a concrete has been used in a very smooth metal formwork and carefully compacted mechanically, producing a very white and shiny surface. A similar use is found in the new mosque in Rome, designed by the Italian architect Paolo Portoghesi in 1989. The white concrete in this building undulates in long, fantastic ribbons that filter the light and which are nearly as interlaced and as tasty as a plateful of *tagliatelle*. The effect of colour and texture of the aggregates can be enhanced by removing the cement film from the concrete by washing the fresh surface before the concrete has completely cured, or by blasting it. A more extreme treatment is to remove the top layer of concrete by fixing a relief of steel cables or battens against the formwork, that is then broken out of the fresh surface in order to create a very rough texture. The walls of the elephant and rhino pavilion in London Zoo (Casson & Conder, 1962–65) are textured in this manner to create a surface against which the elephants love to rub their tough hides.
No material lasts for ever, and even concrete ages. Every material is affected by wind and weather and wear by humans. Sometimes the effect is a beautiful patina which enhances the expression. Weathering and pollution leave traces such as streaking effects near window sills, localized darkening or loss of colour, some of which can be foreseen and planned to some extent. Metal salts from green copper or corroded steel can stain colourful contrasts on monochrome concrete surfaces.
However, sometimes decay can proceed to such an extent that what remains is a useless ruin. Concrete surfaces which are eroded by the effects of frost or

salts and where the reinforcement steel is being exposed and corroded as a result, will threaten the building with destruction and must of course be taken care of immediately. In whatever connection or condition a material is found, it has properties which can lead to new interpretations and attitudes.
Concrete is predominant in our culture, just as it was in Roman times. Hence it is particularly important that we appreciate this material and that we learn to understand and assess both the technology and the means of expression that go with it.

Reproduction

The formwork in which concrete is cast must be fashioned with some understanding of the transformation of the material through the process from an idea to a finished structure of cured concrete. The form can be compared to a machine waiting to be filled by the gravitational energy of a material and to be started.
The history of modern concrete is approximately contemporary with that of photography. At the same time as Smeaton designed the lighthouse at Eddystone, it was known that silver salt, which is a main ingredient in traditional photography, darkens under the influence of light. Both materials share their suitability regarding reproduction. Concrete is cast against a form which is the negative picture of an idea, while the photograph is printed from the exposed and developed negative film.
Like metal, glass, and plastic, cast concrete is suitable for both repetition, reproduction and original works.

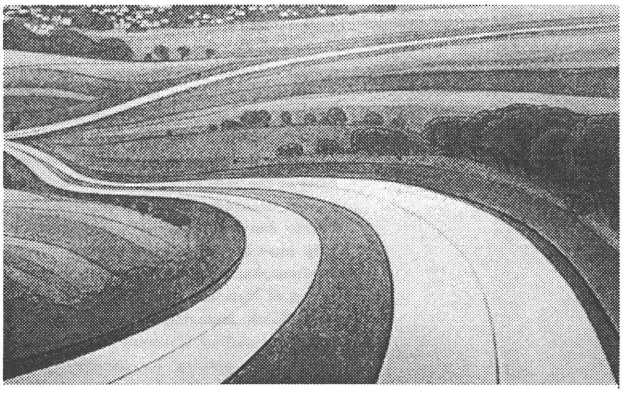


Alberto Burri's reinterpretation of the Sicilian town of Gibellina after the 1960s earthquake.

With its simple and variable mineral substance, concrete is a material which can be used on a large scale, both technically and aesthetically.

Romanticism and tragedy

At the end of the 1960s an earthquake erased the Sicilian town of Gibellina. The artist Alberto Burri proposed to cover the blocks of the old village with concrete, in order to preserve the remains of streets and houses as a bas–relief, without too strong emotional connotations.
The imprint forms the scenery of an annual theatre festival, the drama lending a new and less risky life to the old village. The use of concrete to cover reactor 4 at Chernobyl after the catastrophe in 1986 was less romantic, but even more necessary. A similar idea came up after the disaster with the Estonia ferry in 1994, both to protect it against marauders and to create a dignified grave memorial. Earlier on, concrete was employed to protect the army of nazi–Germany creating another type of monumental landscape. Along the Atlantic a chain of concrete bunkers formed the Festung Europa. Inspired by this example the French architect and philosopher Paul Virilio wrote: 'In brick or stone constructions, in assemblages of discontinuous elements, the balance of the buildings is a function of the summitto–base relationship. In the construction of single–form concrete, it is the coherence of the material itself that must assume this role: the centre of gravity replaces the foundation. In concrete casting, there are no more intervals, joints –everything is compact; the uninterrupted pouring avoids to the utmost the repairs that would weaken the general cohesion of the work.'[2] At the same time, the scenic qualities of concrete were brought out as it was used to create the miles and miles of new motor ways, as long ribbons through the landscape. Time is marked rhythmically, faster and faster, while cars accelerate across the joints in the cast concrete. As an ornament for a new age the concrete made the landscape accessible for both Volkswagen cars and Tiger tanks. In spite of its name even the iron curtain was largely made of concrete. When the wall was torn down little chunks of concrete, communist grey on one side and covered with colourful graffiti on the other, acquired a value as relics in the all enveloping market economy.



The first *Autobahn* predates the nazi-era and was built in 1932 under Mayor Adenhauer of Cologne to connect that city with Bonn.

Epilogue

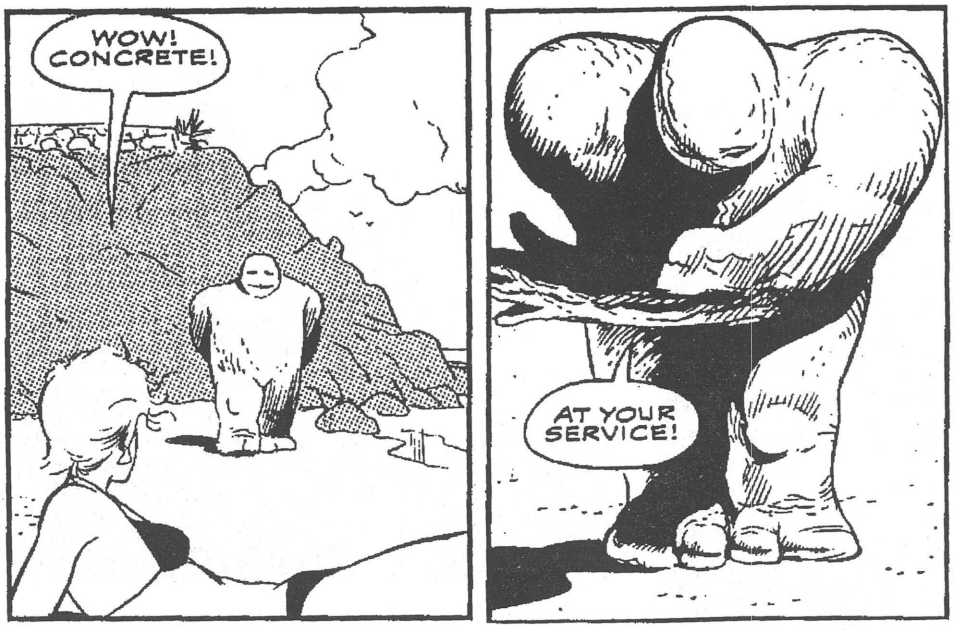
The English word 'concrete' comes from the Latin verb *concrescere* which means 'to grow together', 'to coalesce'. This goes very well with the bonding properties of concrete, but the word also gives rise to

associations to the adjective 'concrete', meaning 'material', 'perceptible'. 'Concrete' is obviously the opposite of 'abstract', 'theoretical'; however, concrete is to a large extent a material which has both concrete and abstract properties and means of expression.
Wet steam from lime and cement which have been mixed with water produces a warm smell of concrete. The wet concrete is poured into firm forms, and we can still make a foot print or a hand print and be enclosed in the sluggish slurry. But time works both for us and against us and soon the wet mass has cured. Further operations can only be performed by physical force and with the help of mechanical tools. The idea resided already in the empty form. Soon it is transformed into the cured substance, leaving a cold mass of concrete.

Ola Wedebrunn is the chairman of the Danish DOCOMOMO Working party. This text was originally published in the catalogue for the exhibition 'Concrete' in the Malmö Konsthall, Sweden, in 1996. Text based on a translation by Gunilla Florby, revised by the editor.

Notes:

1. Henry Russell Hitchcock and Philip Johnson, *The International Style: Architecture since 1922*, New York 1932.
2. Paul Virilio, *Bunker Archeology*, New York 1994. Cast and cut blocks of concrete, from the former Musée des Travaux Publics, A. Perret, Paris, 1937.



'Wow! Concrete!', comic strip by Paul Chadwick, from the magazine *Concrete Quarterly*, Nº-171, 1991.

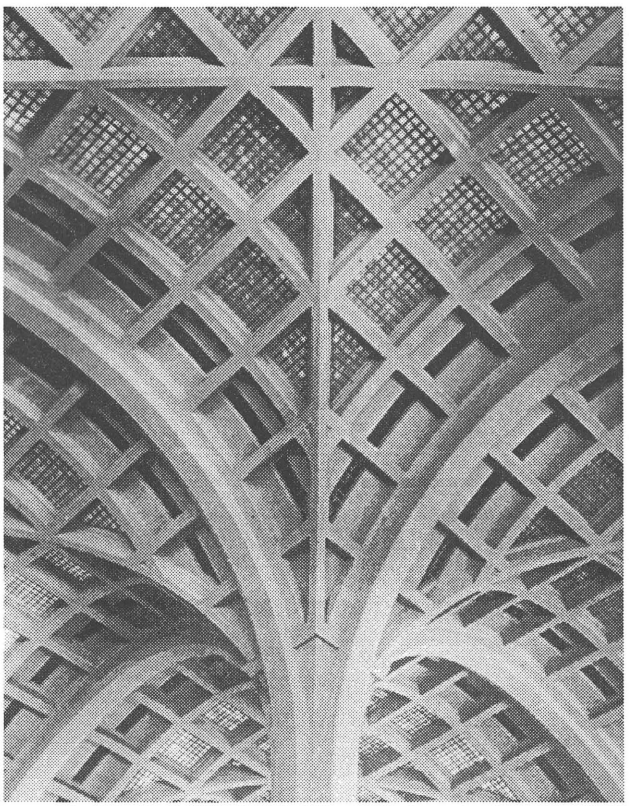
José Luis Delpini (1897-1964)
Centennial of an unknown master engineer

The Argentine engineer José Luis Delpini (1897–1964) has nearly but unjustly been forgotten as one of the great structural engineers of the Modern Movement. His innovating spirit and highly individual professional approach resulted in such original construction types as 'preformed' concrete, that were put to practice with great confidence in a man–made future. Despite being well recognized by noted contemporary pioneers like Nervi, Candela and Torroja, Delpini never received the general acknowledgement that they enjoyed, and his name even lacks in the recent catalogue for the great exhibition on l'Art de l'Ingenieur in the Centre Pompidou. To celebrate this year's centennial of the Argentine Master of Concrete some of the most fascinating of his works are presented in this DOCOMOMO journal by his former student Juan Maria Cardoni. Among them is Buenos Aires' famous La Boca Juniors' stadium of 1932–34, that was consolidated under his direction in the late 1980s.

by Juan Maria Cardoni and Wessel de Jonge

Born in 1897, Delpini was educated as a structural engineer at Buenos Aires University, where he graduated *cum laude* in 1921. At the time, standards in concrete constructions in Argentina were relatively high, through the professional knowledge and experience of German engineers and contractors who immigrated to the young nation.
Fully in line with the spirit of the great engineers in Europe who anticipated a man-made society, Delpini had an inclination towards the innovative. In his search for optimal constructions he introduced a number of structural typologies that were unprecedented in Latin America. Working as an apprentice for Delpini at the age of 14, his later employee Juan Maria Cardoni recalls the *Maestro* as a designing engineer, who argued that 'calculation can never turn a poor design into a good structure'. He drew the forms of thin concrete shells, paraboloid

The extensive use of glass blocks in the concrete vaults of the Abasto market hall. Period photo: courtesy Cardoni.



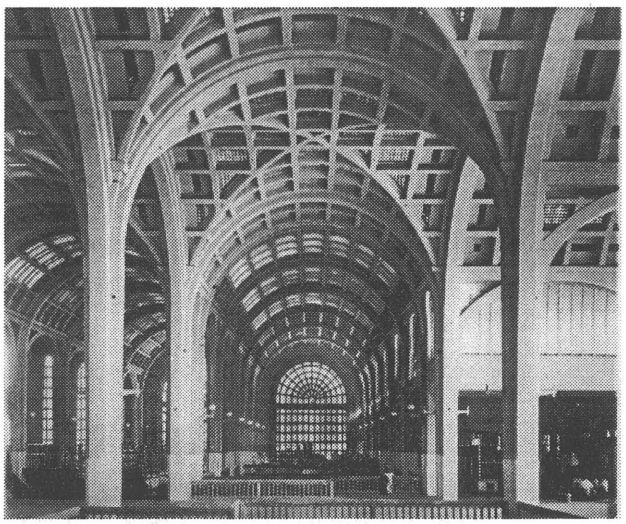
The Abasto Proveedor market hall is under redevelopment today. Photo: Wessel de Jonge.

foundation slabs and 'preformed' structures from his profound knowledge of the nature of materials, before calculations would prove his ideas to be right.

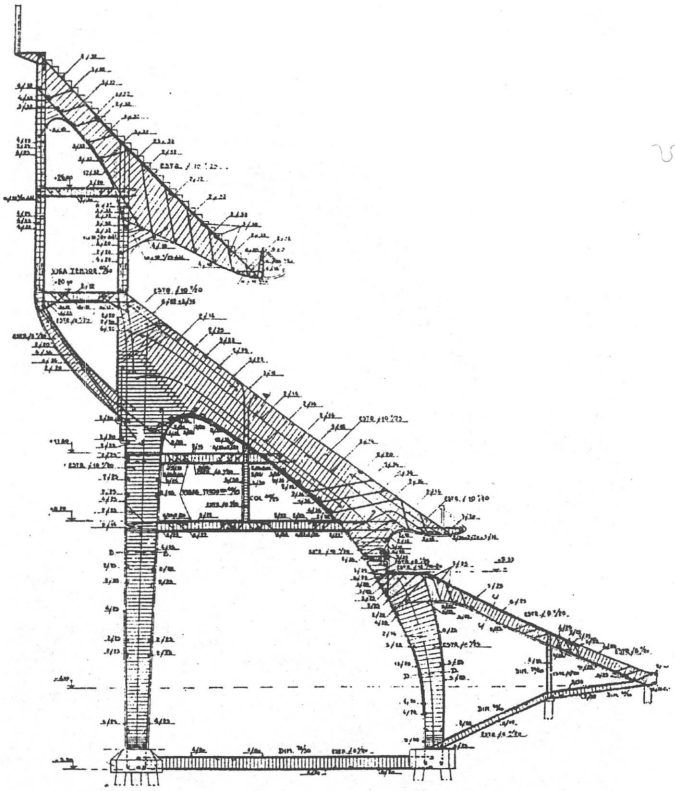
On the edge

Already in his late twenties Delpini had the opportunity to design some of Buenos Aires' largest and characteristic buildings of the time. In the context of the era the Abasto Proveedor market hall, designed by Delpini, Sulcic & Bes engineers in 1924 and finished in 1937, is considered one of the first and prominent manifestations against academism and decorative architecture in Latin America. The building presents an early application of glass blocks in concrete of a scale unknown to this part of the world, thanks to which the 14,000 square meters of floor area could be covered with roofs of translucent cassettes. The main vault spans 26 m. and measures 36 m. in height. The design predates the famous Fair hall in Brno, Czechia (Kalous and Valenta 1926–28), that has some similarities as regards the parabolic form and the quality of daylight. Today the market hall is under redevelopment in an effort to revitalize the run down Abasto district in the Argentine capital.
The stadium for La Boca Juniors was designed by the same office in 1932–34, and was inaugurated in 1937. The engineers are noted for the splendid way in which they managed to design a stadium for 100,000 spectators whereas the site seemed to allow for an arena for 60,000 only. The lot in the densely populated La Boca quarter was limited to a slightly irregular 187 x 114 m. rectangle. In order to master the problem Delpini projected an ideal, 187 x 170 m. plan for an oval two–ring stadium on the site and cut off the part that could not be fitted in, producing a scheme with stands along three sides of the field. By introducing a third ring that projects over the boundaries of the property, high above the narrow streets, the capacity of the stands was increased by 60 %. In static terms, the additional stands are designed as a balancing construction supported by the row of perimetral columns that are part of the portals that carry the second ring. Delpini's solution is visualized by a graphic that explains as well the way the forces are guided through the portals to the foundations, the tension and compression diagrams in the structural members and the balance that inspired the marvellous design of the portals.
For a site next to La Boca stadium an olympic swimming stadium was projected in the 1950s. It was to be covered with an ingenious fold–away roof consisting of enormous arches with a span of 100 m. Though the covered stadium was never built the spring towers were constructed after Delpini's design. The main tower is a concrete construction of an astounding simplicity and beauty. It is a fascinating example of a series of contemporary works in which he exploited the distinction between compression and tension strengths in order to economize on materials. The tower features external reinforcement that has been post–tensioned. The main bars serve as handrails for the athletes at the same time. The 50 mm. thick single concrete slab sufficiently withstands compression with just 1/8 of the material used for common spring towers constructed in integrated reinforced concrete.
The structure is such a clear and far reaching illustration of an engineering philosophy that it can almost be read like a textbook. In 1953 the La Boca spring tower added a new dimension to Delpini's

The magnificent day lit interiors of the market hall. Period photo: courtesy Cardoni.



Section through the stands of La Boca stadium. Period drawing Delpini: courtesy Cardoni.



balancing act that had started with the arena design in the mid 1930s.

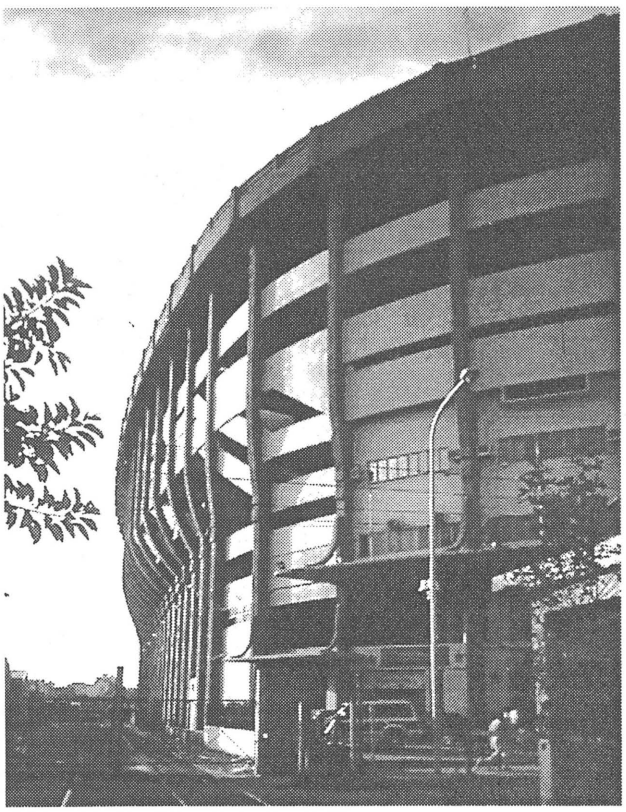
Paraboloids

Like many of his contemporaries, Delpini was involved in designing structures with a minimum of materials used. In doing so he increasingly challenged his skills to push the constructions he designed to their structural limits.
The Condor bus terminal in Buenos Aires (1941–42) is covered by *Dywidag* reinforced concrete shells with a 35 m. span, with sky lights in between. The reinforcement is arranged to materialize the parabolic lines of the isostatic diagram of tension forces, so that they are loaded to their safe maximum. The reduction of rebar allowed for a concrete slab of just 80 mm. Another elegant illustration of Delpini's ideals is the Italar weaving mill (Morón, 1947). The structure consists of slender parabolic arches with a 40 m. span that support horizontal trusses of 60 m. length that protrude at both ends. In the midsection the trusses are suspended from the high parabolic frames, while at both ends they rest on the arches. The trusses on their turn support a perpendicular substructure that consists of sheds that are made up of three 25–30 mm. thin, prefabricated concrete shells. The windows under the trusses allow plenty of daylight. Despite the large width of the required floor area of 60 m. Delpini succeeded in designing an extremely lucid frame that predominates the architectural character of the building.
A similar motive to reduce materials led to a particular type of foundations for high rises such as the Chopitea and Donizetti towers and the 1957–60 Las Heras apartment building, with a height of 100 m. above foundations, 33 storeys and 3 basement levels. A common solution on the banks of La Plata river is a foundation slab of several meters thickness. With the engineers H. Fernández Long and A. Bignoli, Delpini developed an undulating foundation slab, with the support walls positioned at the lowest sections. Due to the sinusoid form of the slab, only tension forces are solicited and double reinforcement could be largely avoided. Moreover, the loads are transferred to the subsoil in an extremely even manner. This way, the thickness of the sinusoid slab could be limited to only 0.65 m. with just 45 kg. of reinforcement steel per square meter. With the 128 m. Donizetti Tower a further reduction to 0.40 m. could be achieved.

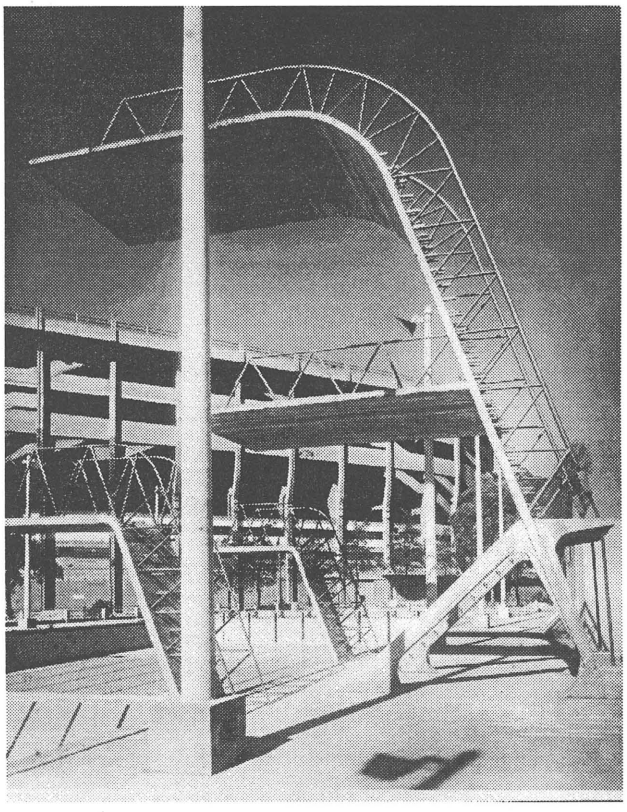
External reinforcement

Like some of his European contemporaries, Delpini took the issue of material economy to a spiritual level with his exploration to materialize the distinction between compression and tension strengths, as was so evidently demonstrated in the spring tower at La Boca. But also his designs for more common usages, such as the Juarros spinning mill of 1942 and the Colgate Palmolive factories of 1960 suggest to exploit

The third ring of La Boca stadium projects over the boundaries of the narrow site. Photo: Wessel de Jonge.



La Boca spring tower with external reinforcement that serves as a handrail. Period photo: courtesy Cardoni.

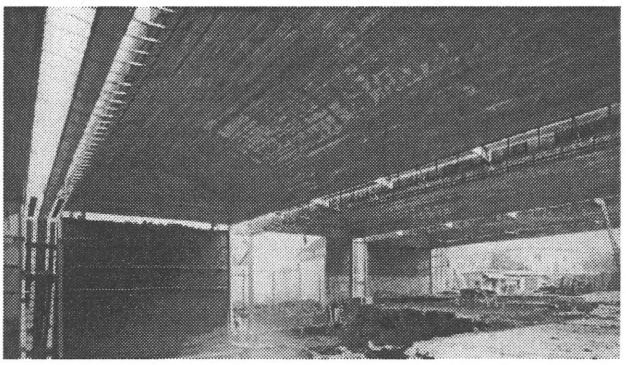


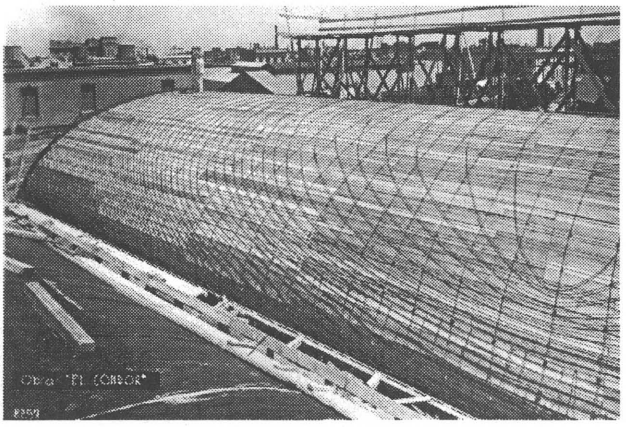
this distinction, taking account of the specific properties of various materials. The Juarros spinning mill in Florida would be an ordinary factory if not for the peculiar trusses. These large structural elements span 27 m. and can be understood as lattice girders with indeed concrete members to resist compression forces. Parts that exclusively solicit tension forces, however, just feature exposed steel bars as tension rods. In addition the roof is made of slightly curved sheds that consist of very thin *Dywidag* concrete shells. The overall impression of this structure with visible reinforcement is that of lightness and ingenuity. The Colgate Palmolive factories in Llavallol are covered by just 25 mm. thin, paraboloid sheds that span 30 m., with double steel profiles 70/70/7 that serve as tension rods. The shells are inclined to allow daylight in through vertical lights that, at the same time, are designed to serve as a stiffening construction for the sheds. Exposed steel rebar is welded to the inside steel of the concrete shells to serve as stiffening members against flexion.
Apart from these daring constructions with exposed reinforcement Delpini experimented with steel fibre reinforcement for concrete shells already in the 1950s, resulting in concrete roofs of just 20 mm. thick.

Preformed concrete

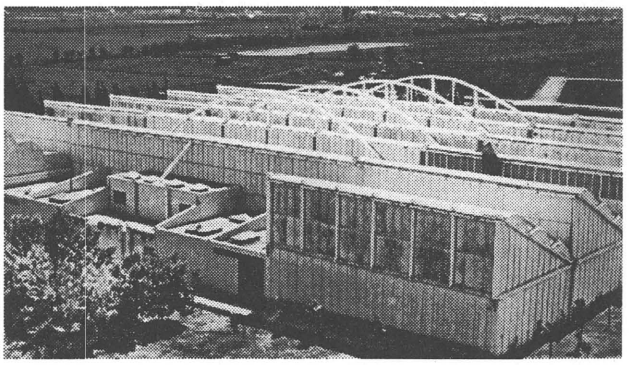
In a further effort to rationalize wide span construction Delpini developed a technique for the production of large concrete components, that is referred to as 'preformed' concrete. Typically, preformed elements are produced at ground level and then lifted to the required height to avoid extensive wooden form works and scaffoldings inside the structure, which is a great advantage during execution of large halls in particular. The overall form is best described as a 'folded cupola', consisting of concrete 'vaults' with a relatively large rise and strengthened by ribs in which the reinforcement is concentrated. The skin of the vaults can sometimes be as thin as 20 mm. This technique was used for a number of structures, the last of which was the 1961 extension for the Gomycuer factories in Castelar that involve 6.60 m. wide, preformed elements with a span of 33 m.
The Italar boiler house of 1959 for a large weaving plant in Morón is an earlier successful example. The use of a forced air stream through a series of large ventilators from above, to control the heat radiation from the boilers and to master the interior climate, was the main cause of the architectural disposition of the building. The vertical elements that make up the facade are curved in such a way that the narrow strip of windows in between them never allow direct sunlight to enter into the interior. All the window frames, either horizontal or vertical, are made of prefabricated concrete.
The roof over the boiler room has a span of 25 m. with a free height of 22 m. and offered an excellent

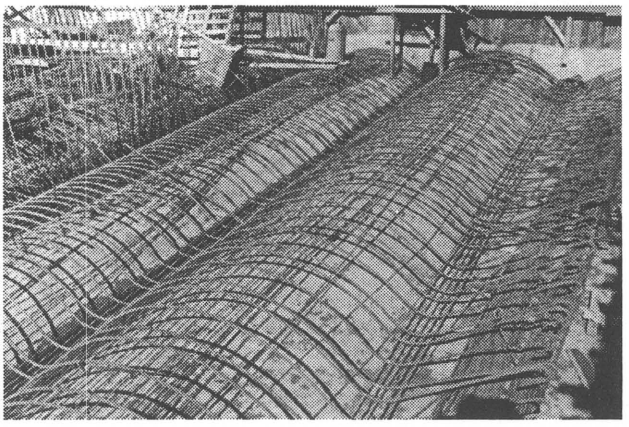
El Condor bus terminal in Buenos Aires (top). Reinforcement patterns in the roof shells follow isostatic paraboloid lines. Period photos: courtesy Cardoni.





The Italar weaving mill (top). The sinusoid foundation slab of Las Heras tower. Period photos: courtesy Cardoni.





opportunity to apply preformed elements. The roof consists of three 'folded cupolas' with a rectangular basis, that were produced on site before being lifted to a height of 22 m. The large folded shells are strengthened by ribs that spring from the corners of each rectangle and incline towards each other in the middle of the span. It is a pity that this magnificent construction can only be enjoyed from the top of the neighbouring tower that serves the water supply of the Italar plant. Still, the elegant concrete elements in the facade produce a spectacular architecture as well, especially at night when the light oozes through the narrow windows to touch the curved columns.

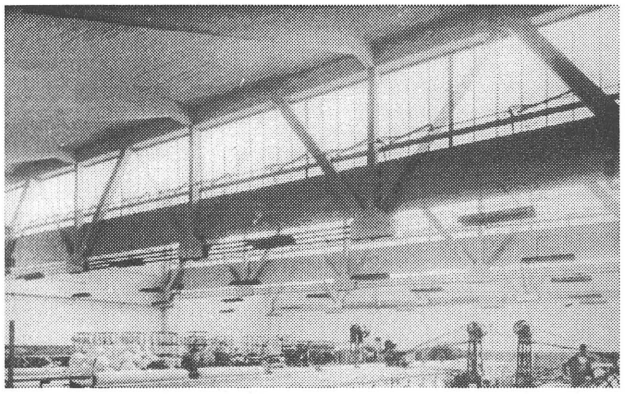
La Boca Stadium

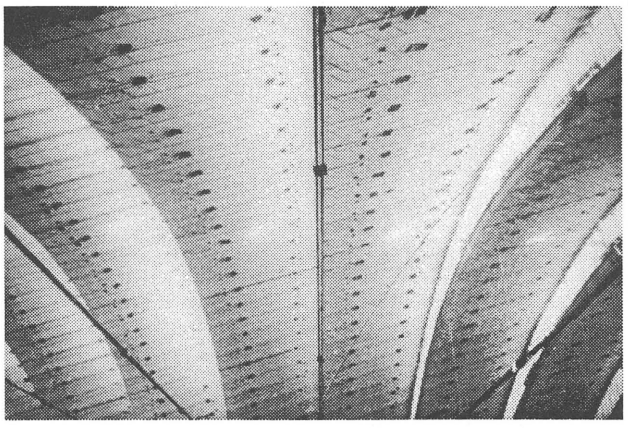
Although the self–evident lightness and ingenuity of Delpini's works suggests their ability to withstand the ages to serve a future destiny, La Boca stadium appeared in need of mayor renovation by the mid–1980s. The works carried out were twofold. For the first time since its inauguration, the concrete structure needed some repairs. On the other hand some functional shortcomings needed to be solved. The lack of sufficient systems in general posed problems already for years. Quite unexpectedly, these shortcomings appeared to affect some structural failures as well. Despite regular maintenance, the structure had suffered from various types of concrete damage. Most important problems related to the concrete structure were:

- advanced concrete damages through carbonation as a result of insufficient concrete covering; at the foot and along the outer edges of the perimetral columns of the main portals deterioration was particularly serious;
- microcracks of structural members of the stands caused by the irregular heavy loads produced at rhythmic intervals by enthusiast soccer *aficionados*, that allowed for water penetration and, consequently, rebar corrosion and spalling of concrete;
- the poor condition or even virtual lack of a sewer system at the joints between the structural members and the portals, as well as between double portals at expansion joints, which worsened water infiltration into the structure; particularly at the double portals and at the curved spandrel beams at the lower end of the rings serious damage was recorded;
- additional damage frequently occurred along the edges of the stands that suffered from serious spalling of concrete – not through rebar corrosion, but due to the concrete being kicked off by spectators to use as projectiles.

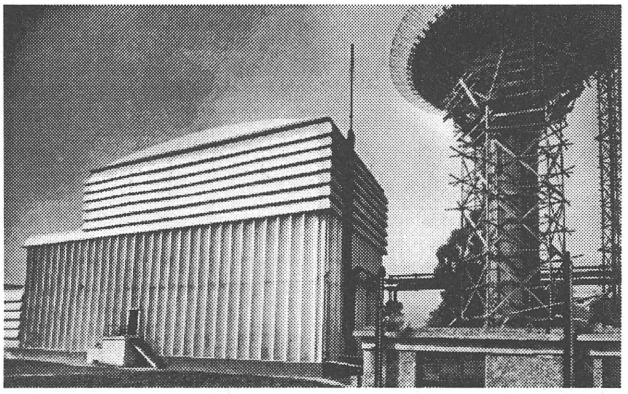
Some members of the concrete structure were deteriorated to such an extent, and spalling so far

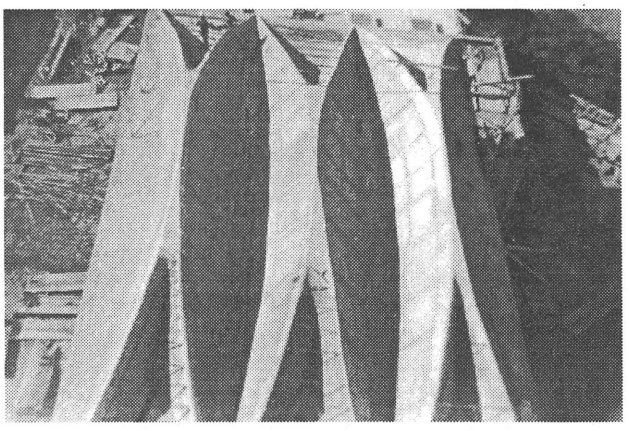
The trusses of the Juarros factory feature exposed reinforcement (top). The inclined shells of the Colgate factory, with external reinforcement against flexion. Period photos: courtesy Cardoni.





The Italar power house features preformed, curved concrete elements (top). The three preformed 'folded cupolas' over the boiler room. Period photos: courtesy Cardoni.





advanced, that the strict safety requirements could no longer be met. The structural distress as found in the concrete frame suggested a strategy in two stages, repairing first the most urgent failures and those elements that prevented the functional rehabilitation of the stadium. This first stage of the repair works were directed by engineer Cardoni, employing concrete repair methods that cover the full range of epoxy techniques. On the longer term, some older damages as well as failures that only appeared during the execution of the first works were taken care of. This second part of the project was done by a colleague, who has been responsible for aftercare and maintenance as well. After this extensive remedial programme the stadium entered a second stage of its life and it is anticipated that the arena will again be able to accommodate Diego Maradona and his team in the coming decades with pride.

Juan Maria Cardoni is a structural engineer in Buenos Aires , a member of DOCOMOMO Argentina, ICOMOS, the Argentine Ass. of Prestressed Concrete (Directive Member), and the Argentine Committee for Monuments and Sites. He was trained by Delpini and worked with him until his death in 1964, after which Cardoni was the only engineer to continue Delpini's studio. Since then Cardoni is the only Argentine who has published and lectured extensively on the Master's life and works, amongst others as a Senior Professor in Civil Engineering at Buenos Aires University. This article is written by Wessel de Jonge on the basis of an extensive interview with J.M. Cardoni in April 1997.
Special thanks to Dr. Jan Molema for his help in translations from the Spanish.

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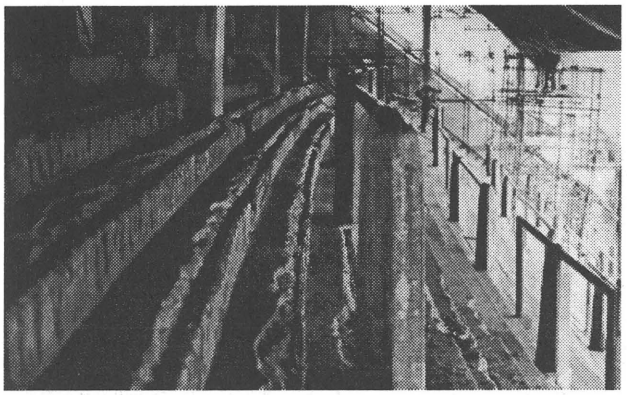
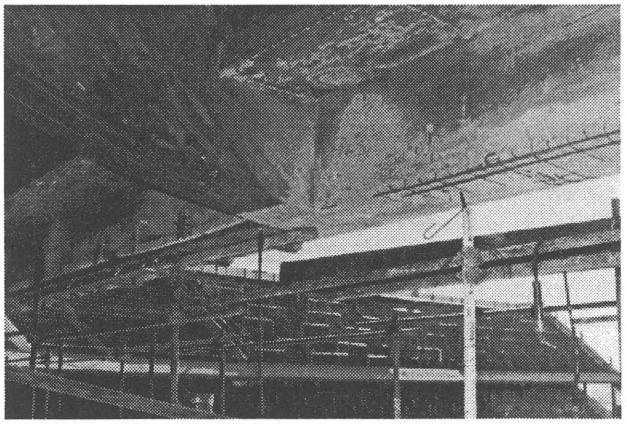
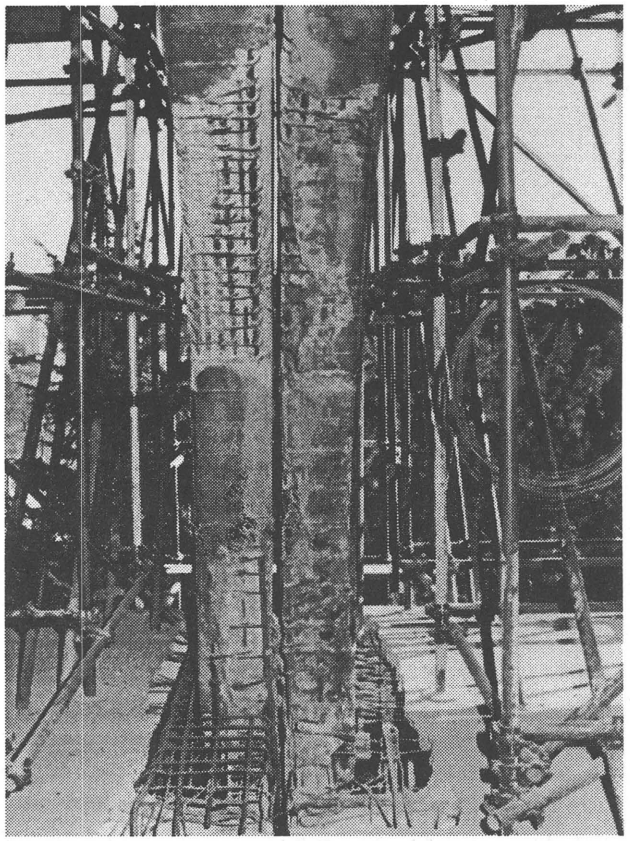
The damaged edges of the stands at La Boca stadium (top). The bottom of the curved spandrel beam along the lower end of the third ring. Photos: J.M. Cardoni.





Repair works at the columns of the double portals involved various epoxy techniques. Photo: J.M. Cardoni.



Preserving more... by doing less!

Principles of electro-chemical concrete repair

Over the years the use of electro-chemical concrete repair has gained an increasing market share, particularly for constructional works such as bridges, motorways and parking garages. Because of its electro-chemical nature this technology allows for deactivation of ongoing reinforcement corrosion with minimum noise and dust, and thus causes minimal disruption to the surroundings. Since only already cracked, spalled or delaminated concrete needs to be broken out and replaced, the extent of patch repair is limited and, hence, most original and mechanically sound concrete can be preserved. This relatively new and sophisticated technology seems to provide excellent opportunities for the conservation of authentic exposed concrete in recent architectural heritage.

by Guri E. Nustad

A majority of concrete damage originates in corrosion of the reinforcement, through the strong expansion of corroding steel that causes the concrete to spall and eventually disintegrate. In principle, there are three ways of addressing corrosion problems in reinforced concrete:

- isolation: i.e. by separating the reinforcement metal from the surrounding electrolyte, which is effectively a corrosive environment;
- immunization: i.e. by creating an environment where corrosion can not occur;
- passivation: i.e. by creating an environment where a corrosion reaction produces a corrosion protective oxide film on the metal surface.

Carbonated and/or chloride contaminated concrete suffering from reinforcement corrosion has traditionally been repaired by replacing the contaminated concrete with alkaline and chloride free concrete mortar. Traditional concrete repair falls into the third category listed above.

Electro-chemical remedial techniques most commonly applied to reinforced concrete structures today are those of *cathodic protection* (CP), *realkalisation* (RA) and chloride extraction (CE).
The latter is also known as chloride removal, but is mostly referred to as *desalination*. Cathodic protection falls into the second category of addressing corrosion problems, while realkalisation and desalination both fall into the third category. The key differences between these techniques are summarized in the above scheme.

Method	Halting rebar corrosion by	Applied current density	Treatment time	Main control of achievement
CP	Sacrificial anodes	None	Continuous	Measurements of corrosion activity of the sacrificial anodes
	Impressed current	5-10 mA/m² steel	Continuous	Potential measurements between rebar and probes
RA	Increasing the alkalinity	1A/m² concrete	5-7 days	pH indicator and analysis of concrete samples
CE	Removal of chlorides	1A/m² concrete	4-8- weeks	Chloride analysis of concrete samples

Cathodic protection

Cathodic protection using sacrificial anodes has been known for more than 150 years, but it is only recent that sacrificial anodes have come into use for submerged reinforced concrete. As the name indicates, anodes are installed to corrode, i.e. to be sacrificed, so that corrosion of other materials is prevented.

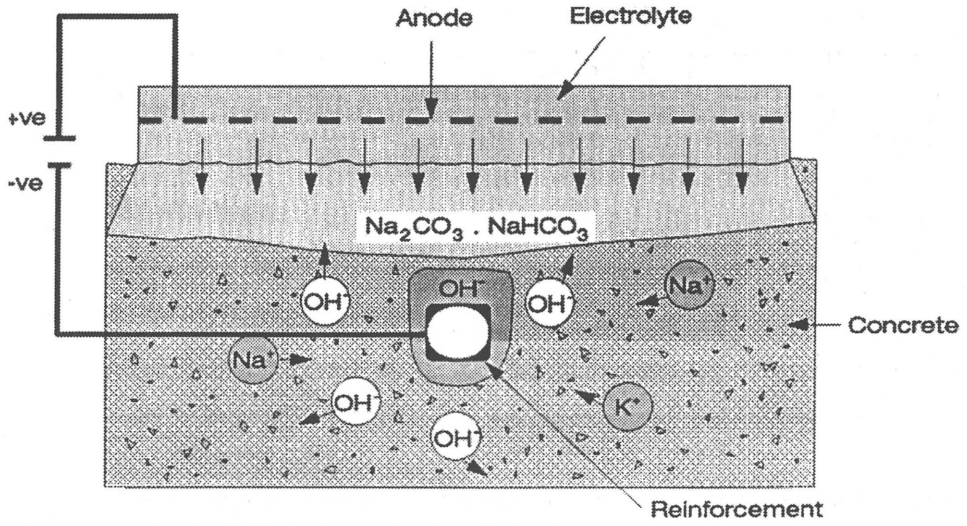
Another well known electro–chemical remedial technique for reinforced concrete structures is cathodic protection, using impressed current. This technology has been recommended for reinforced concrete structures already since 1977.[1]
A variant of impressed cathodic protection, using a lower current density, may as well be applied on new concrete structures as a preventive measure against corrosion. Cathodic protection is a permanent installation, which so far has been applied to some 500,000 m² of corroding concrete structures in Europe. Cathodic prevention has been applied to about 140,000 m² of new concrete structures.[2]
Realkalisation and desalination have been used commercially since 1987.
During the first year, 400 m² of concrete were realkalised and 60 m² desalinated. In 1996 alone, about 40,000 m² were realkalised and about 15,000 m² desalinated. By the end of 1996, a total of more than 200,000 m² had been treated with these methods.

Realkalisation

Carbonation occurs as a result of carbon dioxide in the air reacting with calcium hydroxide in the cement mortar. As a result, the pH of the concrete pore water is reduced and the concrete's natural protection of the reinforcement steel against corrosion is broken down. Since the carbonation reaction itself increases the concrete's strength, the idea emerged to re–establish the alkalinity of the concrete pore water without removing the carbonated concrete itself. In the mid–1980s, investigations were carried out to identify various possibilities of regaining lost alkalinity by:

- diffusion and adsorption of an alkaline solution into the concrete;
- production of hydroxyl ions (OH^-) inside the concrete;
- electro–osmotic transport of alkaline solution into the concrete pores.

Diffusion and adsorption depend upon concrete porosity and humidity. The two latter mechanisms require the application of an electric field. Production of hydroxyl ions depends upon the resulting current flow, while electro–osmotic transport depends upon the strength of the electric field applied.
Several electrolytes were tried. It is beyond the scope of this article to describe the investigation program, but as a result, alkalinity was found to be efficiently regained by transporting a sodium carbonate solution into the concrete pores under the influence of an electric field.
Being an easily soluble alkaline buffer, readily available, inexpensive and easy to handle on site, sodium carbonate immediately became the preferred electrolyte for regaining lost alkalinity and, so far, it has been used on all commercial realkalisation projects.
Realkalisation is performed by applying an electric field between the reinforcement steel in the concrete and an anode embedded in an electrolytic reservoir, which is temporarily placed on the concrete surface. During treatment, the alkaline electrolyte is transported into the carbonated concrete. In the diagram this is symbolized by a penetrating front. Simultaneously, electrolysis at the reinforcement surface produces hydroxyl ions (OH^-), symbolized by the ring around the reinforcement, while free sodium (Na^+) and potassium (K^+) ions in the concrete migrate towards the steel. These mechanisms increase the alkalinity in the carbonated pore water sufficiently to re–establish passive conditions of the reinforcement, typically within one week of treatment.



The principle of realkalisation. Diagram by Fosroc NCT

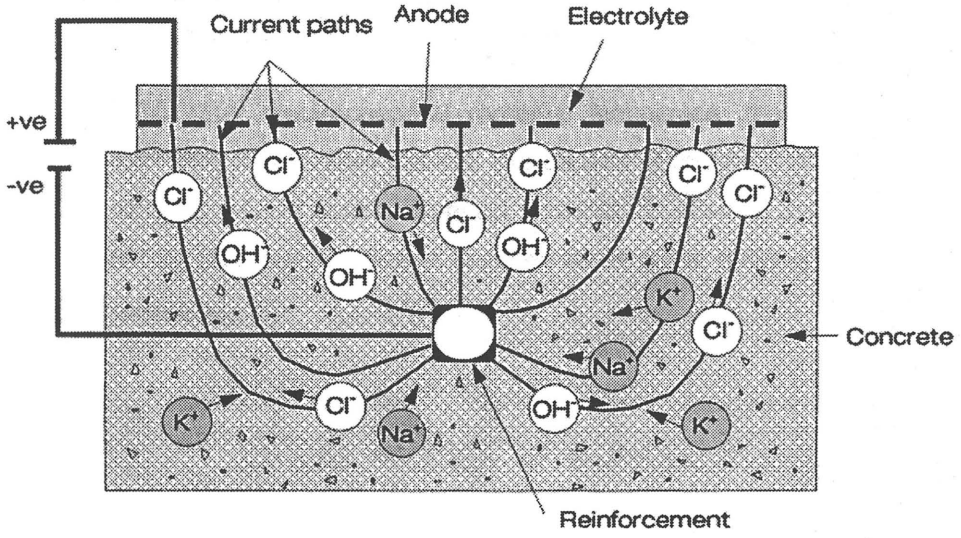
Desalination

In the early 1970s, chloride induced corrosion was recognized as an extensive and serious cause of deterioration of concrete bridge decks in the USA. As a consequence, possible methods to halt and prevent such damage were investigated. Lankard[3] and his team, for example, removed large amounts of chlorides within 24 hours under the application of a 100 VDC electric field. Due to the large amounts of energy required the method was not, however, considered feasible and work in this field was halted.

In the mid 1980s, on experimenting with a method to measure chloride diffusion in concrete, it was noticed that chloride ions can penetrate concrete rather quickly under relatively low voltages. Thus, the idea of extracting chloride ions rapidly by reversing the polarity was conceived. Laboratory tests proved successful and during the winter of 1987–88, this technology was applied on the soffit of an indoor swimming pool. The results were encouraging, with a considerable reduction in chloride content within 8 weeks of treatment.

As in realkalisation, desalination is performed by applying an electric field between the reinforcement in the concrete and an anode embedded in an electrolytic reservoir and temporarily placed on the concrete surface. The main practical differences between these methods are the electrolyte, the anode material and the treatment period.

During treatment, the chloride ions (Cl^-), being negatively charged, are repelled from the reinforcement surface and are moved out of the concrete as symbolized in the diagram by the current paths. Simultaneously, electrolysis at the reinforcement surface produces hydroxyl ions (OH^-) which increase the pH level in the surroundings of the reinforcement, while free sodium (Na^+) and potassium (K^+) ions migrate towards the reinforcement. These mechanisms are then sustained until the chloride content of the concrete has been reduced sufficiently to avoid reinitiation of reinforcement corrosion, which typically requires some 4 to 8 weeks of treatment.



The principle of desalination. Diagram by Fosroc NCT

Practical application

Realkalisation and desalination can be performed under all weather conditions as long as the electrolyte does not freeze. These techniques are suitable for most types of reinforced concrete, but are not necessarily universally applicable. Prestressed and post-tensioned structures and any concrete with unusual characteristics require thorough investigation to assess suitability.

Structures that have been realkalised include facades of office blocks, facades and balconies of apartment buildings, water towers, and various structures with a special architectural significance, amongst them an increasing number of listed buildings. Desalination has typically been used for concrete columns, decks and soffits of bridges, abutments and car parks.

Compared to other electro-chemical remedial techniques, a major technical advantages of realkalisation and desalination is that the causes of the reinforcement corrosion are removed within a defined treatment period.

The effect of the treatments is easily monitored and documented by analysis of concrete samples taken out at defined test locations before and after treatment. In addition, all electro-chemical repair techniques even halt corrosion at undetected locations.

It is important to realize that the nature of traditional concrete repair requires breaking out and replacing all contaminated concrete, also when mechanically sound, whereas with electro-chemical techniques the replacement of authentic material is limited to only those areas that are already cracked, spalled or delaminated. The risk of inducing micro-cracks during extensive break-out of concrete is reduced at the same time. In terms of architectural preservation electrochemical remedial technology therefore offers new opportunities, that might help to maintain our cultural heritage for the future.

Guri E. Nustad is a corrosion engineer and international project manager at Fosroc NCT in Oslo, Norway.

Notes:

1. J.B. Vrable, 'Cathodic Protection of Reinforced Concrete Bridge Decks: Laboratory Phase', *NCHPR Report Nº 180, Transportation Research Board*, Washington 1977.
2. Cost 509, 'Corrosion and protection of materials in contact with concrete', Workshop, Edinburgh 1996.
3. Lankard et. al., (Federal Highway Administration, Office Research & Development), *Neutralization of chloride in concrete*, Washington 1975.

A delay of decay

Notre Dame de Royan (Guillaume Gillet, 1955)

Since its construction, the Notre Dame de Royan has been a symbol of liberty for a city devastated by war. The sculptural expression of the elliptical cathedral is enhanced by an extensive use of exposed concrete, that characterizes as well the interior. In 1986, concrete failure had proceeded to such an extent that the bells of the church had to be silenced. Previous patch repairs appeared insufficient and a long term remedial program was initiated in 1989, carefully matching the original textures and colours. A first phase of the works has been concluded and last year, Royan could again enjoy the sound of the bells of the Notre Dame. But architect Philippe Oudin questions the long term effects of the repairs, that might only delay further deterioration. A critical report.

by Philippe Oudin

The urban plan for the reconstruction of the city of Royan after the raids of April 1945, was conceived by Claude Ferret. His scheme was aimed at an entirely new urban image, as a symbol of a new liberty. The reconstruction of the church of Notre Dame was commissioned to Guillaume Gillet after a

An aerial view of the Notre Dame in the urban context of Royan. All photos courtesy of Philippe Oudin.

competition in 1953, and was built between July 1955 and July 1958. The cathedral represents an important step in the history of construction and religious architecture of the 20th Century in France. It was listed as a 'Historic Monument' on February 10 1988. Both the inside and the exterior of the church of Notre Dame presents a characteristic fair faced concrete with exposed granulates.

Horse saddle

In coordination with the engineer Bernard Lafaille, Gillet designed the plan of the church as an ellipse, which allowed for the roof to be designed as a hyperbolic paraboloïd: a double curved shell like a horse saddle. The supporting structure of the church consists of thin concrete, V–shaped columns along the perimeter of the ellipse. These columns are retained at the lower end by the thin concrete vaults of the inclined ambulatory roofs. The facade segments are then joined and braced by two passerels –an upper and a lower one– that follow the elliptical shape of the church, and by a concrete ring on top. The magnificent glazings in between the columns, that predominate the interior atmosphere, are the work of the glass painter Henri Martin Granel.
The hyperbolical shell is very thin and less than 10 cm thick. It rests directly on the concrete ring. The double curved roof alternatingly solicits tension and compression, depending on the axis considered. Along the East–West axis, from bell tower to choir, the roof works as a suspended canvas resisting tension forces. The suspension cables are anchored in a crowning arch that is supported by the concrete columns. Along the North–South axis, the roof works as a vault resisting compression, necessitating a steel tension rod at its base. The bell tower in the East, consisting of three similar columns, predominates the general structure. The concrete frame of the belfry is inscribing these structural members. It is detached from the main structure of the tower and supported by corbels that project inward from the concrete columns. The room between the belfry and the three columns accommodates louvre–boards to amplify the sound of the bells.

Heavenly waters

The cathedral was constructed in a very short time and with a low budget. This explains the cut backs in dimensions as compared to the initial project, in order to reduce costs. Soon after the inauguration on

10 July 1958, the building presented its first defects already in 1960, due to water tightness problems that caused leakages. In 1967, water infiltrated along the frames of the stained glass as well as along the perimeter of the concrete roofs over the ambulatory, the baptistery and the holy water basin. In 1972–73, works started to waterproof the concrete but this appeared insufficient to solve the problems.
The steel reinforcement of the concrete started to corrode and caused the concrete to crack and spall, thereby accelerating the steel to deteriorate. Series of patch repairs with resin–based mortar never produced satisfactory results, neither in static nor in aesthetic terms.
It were typically the free ends of the V–shaped columns that suffered most. At these locations the concrete was seriously cracked, and the corrosion of the steel rebar had resulted in the spalling of large pieces of concrete, sometimes over 20 cm wide. Due to the rebar then being fully exposed, the steel further corroded at an even higher pace. In 1986, concrete distress at the belfry had accelerated to such an extent, that the bells could no longer be used for tolling.

Provisional studies

The first preliminary studies for restoration works were commissioned to the engineers Lucient Boudet and Veritas in the next year. A very detailed and systematical recording of defects was performed. Scaffolds were used for close observation of the defective areas:

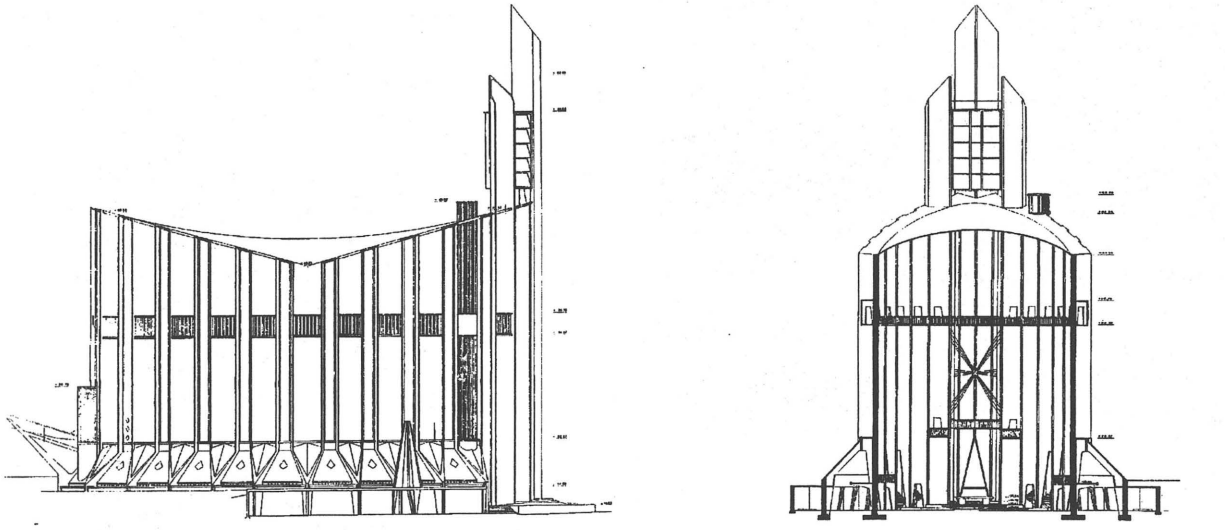
- the envelope of the building and the affected members of the structural frame were closely examined;
- the interior lay out of the rebar inside the concrete was carefully mapped by use of over three hundred X–ray exposures, presenting a life size view of the reinforcement patterns;
- after measurements, samples of the concrete were carefully taken out for physical and chemical analysis in a laboratory.

The official Provisional Study *(l'Etude Préalable)* that we undertook in December 1989 summarized the results of such earlier investigations and analyses, and proposed a restoration method in technological terms, as well as a time table to execute the works in various phases.
To respond to the most urgent needs first, it was decided to start with the works on the belfry, since the lack of stability of the bell tower was of particular concern.

Analysis and methodology

Additional testing was then scheduled, complementing all those that had been done by the City of Royan before the listing of the building. These analyses were commissioned to the 'Laboratoire Régional de l'Est Parisien de l'Equipement', under the supervision of the CETE of Bordeaux. Tests were performed at four zones of the bell tower that were accessible.
The analyses concentrated on assessments of permeability, carbonation, and electric potential of the rebars.
The conclusions drawn from these tests indicated that:

- the concrete was generally very brittle and of a non–hygroscopic nature;
- the carbonation depth and the level of chlorine measured were mostly not of such a nature, that the rebar was expected to be depassivated in zones with sufficient concrete covering;
- the measurements of potentials as well as the visual inspections that were made beforehand, supported this assessment;
- all reinforcement steel in carbonated zones as well as exposed rebars showed corrosion or were about to corrode.



South elevation and section showing the saddle roof and the concrete vaults of the ambulatory that retain the facade columns. Drawings: Guillaume Gillet.

This last investigation confirmed our approach as far as the restoration principles were concerned, as included in the Provisional Study, to establish the Architectural and Technical Project *(Projet Architectural et Technique)* for the restoration of Royan Cathedral. It appeared necessary to treat or replace all the rebars that were certain to corrode in carbonated areas, either covered or completely exposed.
Consequently, in the affected zones, the concrete that was cut out was to be remade. Unaffected rebars still sufficiently covered were not expected to pose a risk on short term.

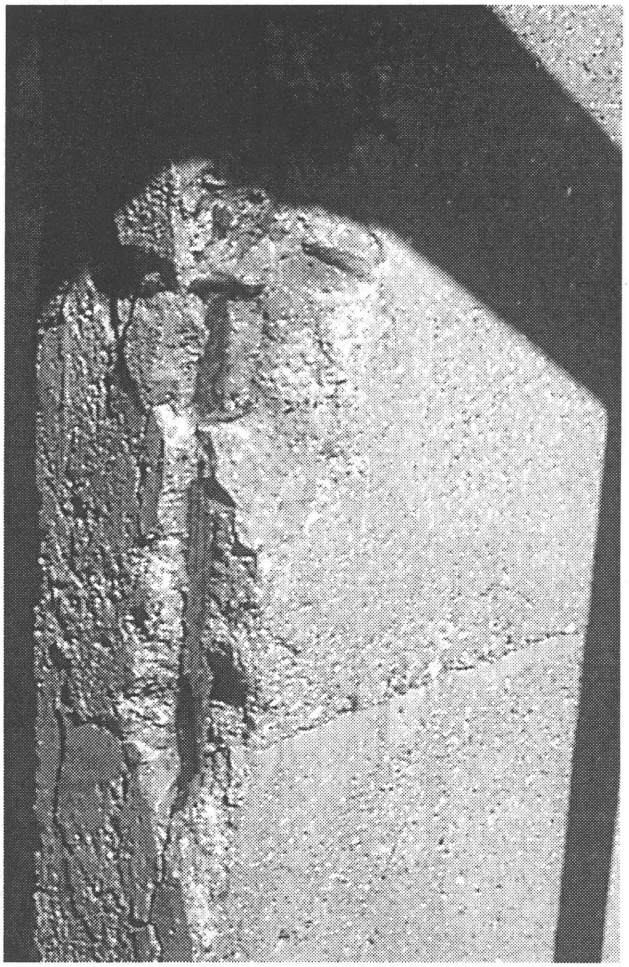
Day joints

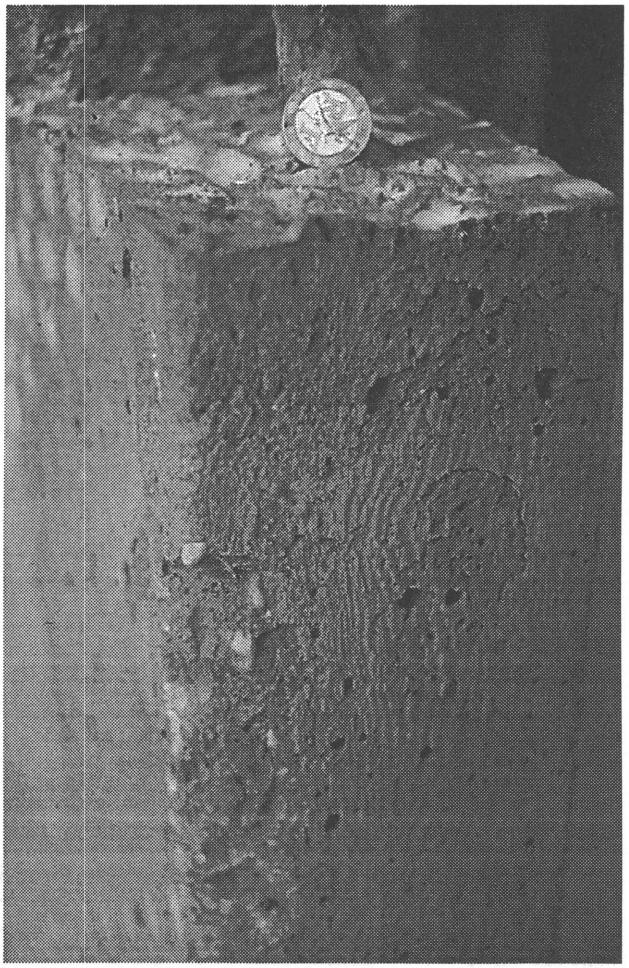
The methodology for the remedial works was determined by the above investigations, complemented by the results of a program monitoring the ageing process at the earlier repairs with resin–based mortar. A complete examination of the concrete structure was commissioned before actual intervention to the Degain enterprise as part of a contract.
A systematic assessment of the condition of the facade columns was performed by pachometric measurements, carbonation testing and sclerometric indications, which were done by CEBTP of Niort, again by use of scaffolds. Results of the study were directly marked on the building face, so that the craftsmen would always have the information on site during the works.
The test results were precisely recorded for all sections of the facades. Analyzing the results learned that sections could be identified by differences in quality that could be carried back to execution circumstances, mainly the production of the high columns in various pourings during construction. The sections were defined by the day joints, according to the number of pourings for each elevation segment, the respective heights of the scaffoldings during construction and so on. However, in general the concrete appeared homogenous, but had carbonated zones. The typical concrete covering on the steel rebars was about 35–40 mm.

Tower

The main works on the columns of the tower concerned the following:
- a complete water blasting to eliminate the chlorines on the surface;
- a mechanical blasting to clear the steel rebars of the rusted coat, in all the zones where the concrete

The thin ends of the columns had suffered most from concrete disorders, causing spalling of the material (left). Test repairs were performed to match colour and texture of repair mortars with existing material. (right)





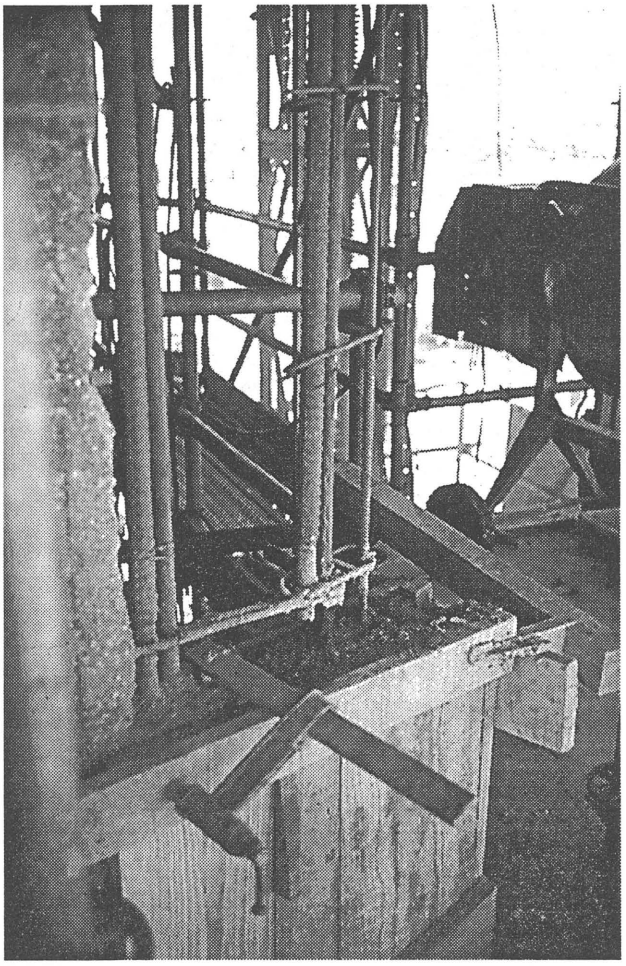
was cracked, spalled or carbonated, as well as in zones where corrosion was suspected;
- the steel rods that were too heavily corroded, were replaced by pretreated bars of the same section;
- the reconstruction of the cut out parts was made with a micro–concrete bonding agent to secure adhesion to the mineral coating around the steel.

These works were performed carefully according to the original drawings of the shuttering, regarding the size and the patterns of the boards, the type and size of granulates, the design of the mortar regarding colour and so on, in order to harmonize with the existing part of the building.
For the thin columns of the tower, small scale works were performed using custom mortars for patch repair. Small elements like the railing of the passerels and the balcony balustrades were completely redone. The stained glass windows were taken down for a careful check of the lead sub–structure, and put up again after appropriate treatment and the installment of compression bands to ensure total waterproofing.

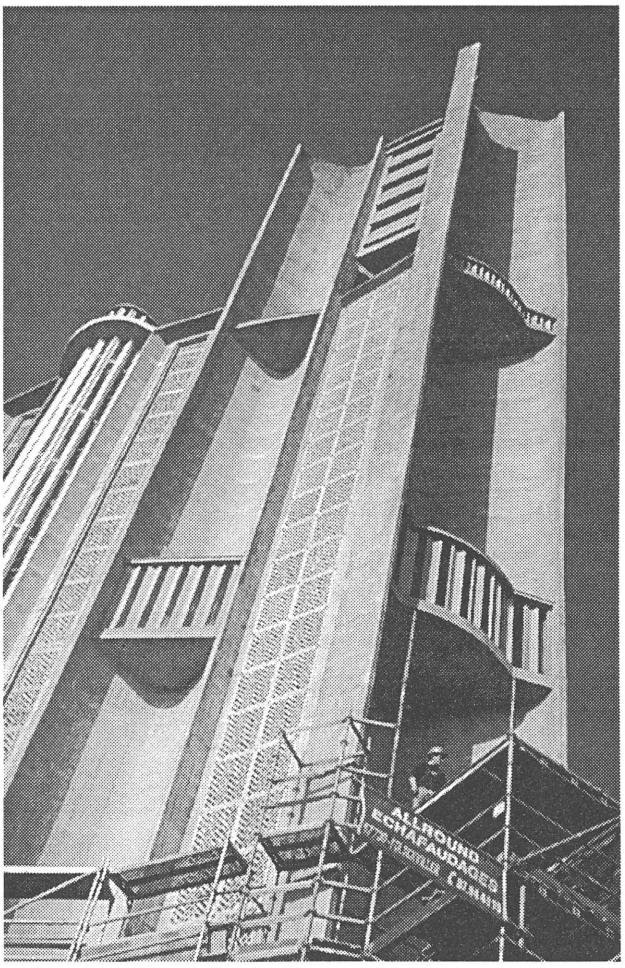
Belfry

For the belfry the approach to respond to the occurring distress was different. The restoration was focussed on and limited to structural problems. The damages affecting the concrete were related to structural deformations due to insufficient stirrups in the reinforcement.
The concrete frame of the belfry suffered from serious failures: exposed steel, open cracks and spalling of concrete, especially at the connections between members. The lower corbels that supported the belfry were expected to have suffered most. The wooden blocks on the supports appeared to have been reduced to thin wedges. The restoration of the belfry consisted of the repair of the reinforced concrete structure and the replacement of all the deteriorated elements. The first works done on the concrete concerned locations that were not visible from the outside. This way we got the chance to define more precisely the remedial treatment for the restoration of the concrete surfaces, the quality requirements to be made to the shuttering, the mortars to be used for patch repairs, and the selection of proper granulates. Calculations of the stability of the belfry showed that it was placed eccentrically on its foundations and that the entire structure of the tower was slightly slanted towards the West mainly due to the weight of the louvre–boards. It was decided to reinforce the belfry,

Repair of the thin ends of the V-shaped columns involved partial recasting. The concentration of rebar posed problems regarding the concrete covering on the steel.



The bell tower during the works. The concrete framed, stained glass has been taken down for repair.



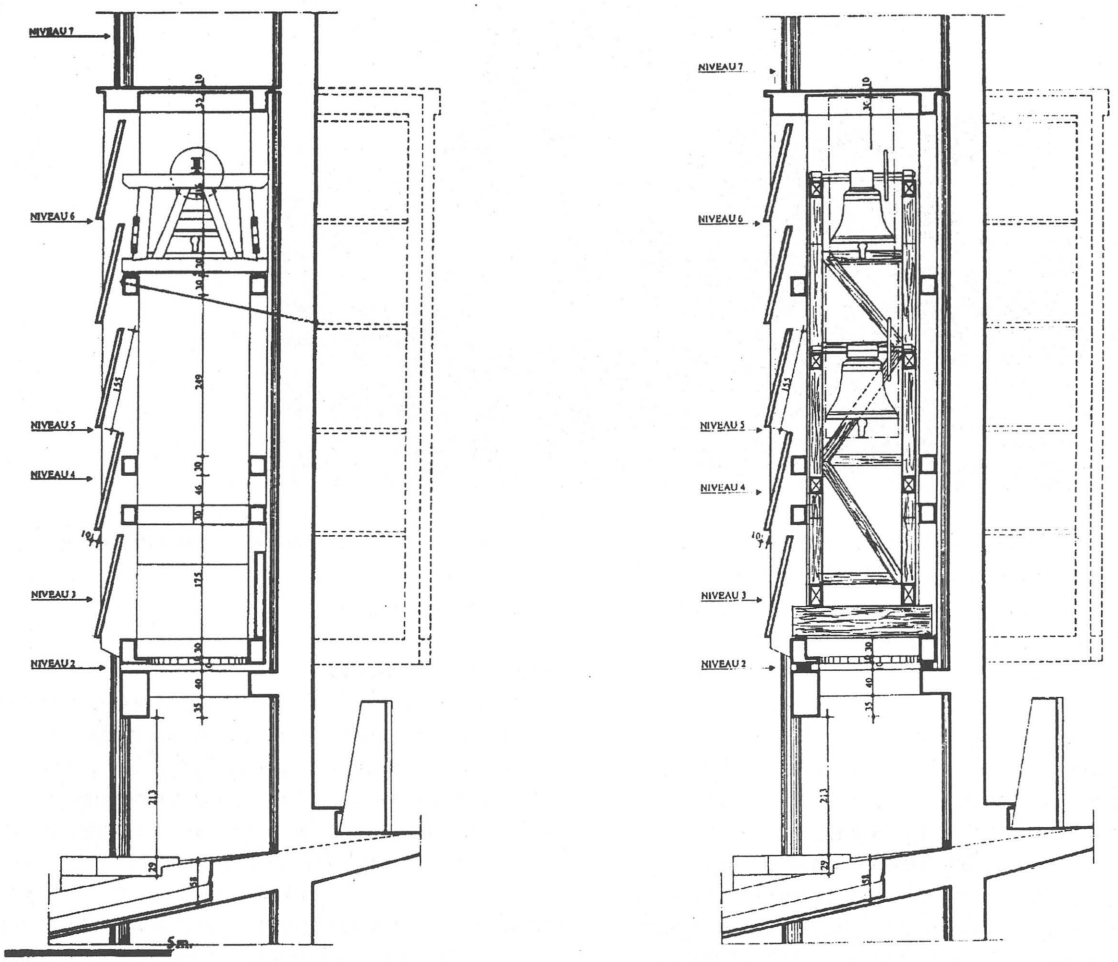
which was necessitated by the static requirements to accommodate the bells, and by doing so, to slow down the deterioration of this part of the building. Additional static elements like prestressed cable, or frames of IPE steel profiles, as were recommended by the studies and calculations of the technicians, would have completely changed the original character. Therefore, we decided not to modify anything but to add a new and completely independent timber structure inside the lower part of the tower. In addition, we changed the axis of the bells to a new direction, along the longest span, so that the belfry would be more appropriately loaded. The corbels projecting out of the concrete columns were remade and covered with neoprene to mute certain frequencies mechanically.

Progress

This first phase of the intervention on the belfry also allowed us to restore the mechanical properties of the materials. The pursuit of the work on all the concrete segments on the other facades are scheduled for this year. Still, it is appropriate to question ourselves regarding the structural evolution of the ageing concrete that is not yet repaired, and that remains exposed to carbonation and its implicated risks. Similar works as done to the tower in this first phase will improve conditions for the entire structure. They will slow down and possibly arrest deterioration in the passivated layers, but will only delay further deterioration and ageing.
It seems that the more recently developed chemical processes as applied in many restoration cases abroad today, could be the answer to our problems. This 'NOVBETON' system, as it is called in France, employs electro–chemical processes to realkalize concrete, and this might effectively protect the steel reinforcement and restore its original properties. This will most probably be the solution we will use for future remedial work to ensure that the bells of the restored Notre Dame de Royan can sound for the next decades.

Philippe Oudin is chief architect for Monuments Historiques in France and in charge of the restoration of Royan Cathedral. Text translated from the French by the editor.

Section through the belfry before (left) and after the restoration. The axis of the bells was changed over 90° to correct excentric loading of the foundations. Drawings: Philippe Oudin.

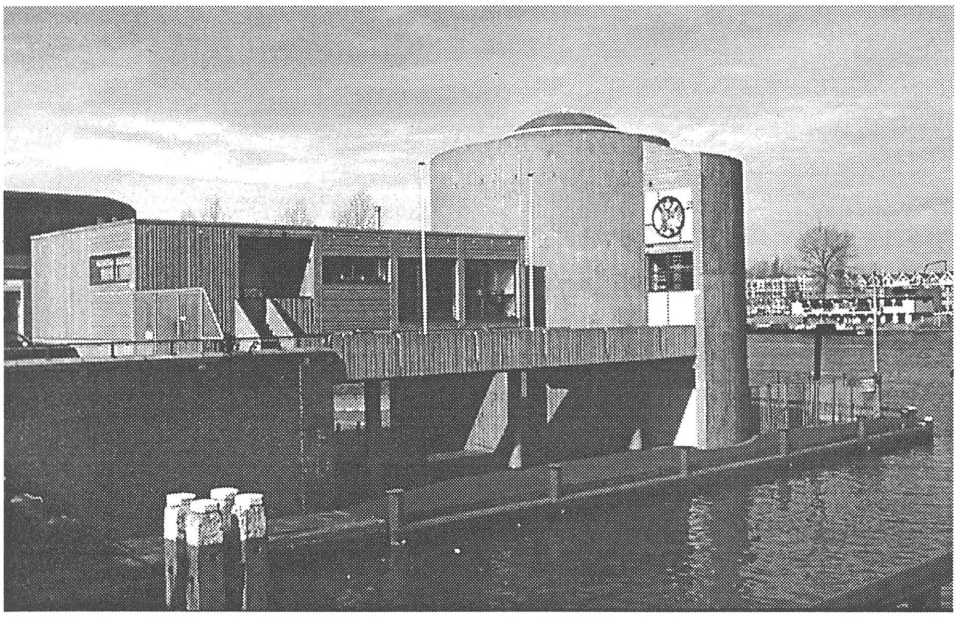


A *brilliant* match ?

Pumping station Parksluizen, Rotterdam

The Parksluizen pumping station is designed as a snail shell expressing the form of the pumping engine inside. The fair faced facades of porous concrete with irregular board marks are characteristic features of the architecture but have been a main cause of concrete failure at the same time. Regular repairs turned the facades into a patch work and did not solve ongoing damage. When a comprehensive remedial program was proposed by the owner in 1994, the municipal Review Committee for architecture and historic buildings demanded greater care for the architectural qualities of this postwar building. Former member Heide Hinterthür presents the committee's perspective in this matter on the next page. Building manager Koos van der Zanden went through great lengths to find a remedial treatment that would stop carbonation as well as match the original colour and the degree of brilliance of the authentic material.

by Koos van der Zanden



The pumping station seen from the nearby dike. The attendant's house creates a bridge to the engine hall. Photo: Wessel de Jonge.

The Parksluizen pumping station and the adjoining attendant's house date from 1968. The pumping engine is to carry off the surplus of water from the ring canal of the Delfland polders into the river Meuse.
The station is designed as a spiral, as an expression of the form of the centrifugal pump that is accommodated in the building. The station is fully made of fair faced concrete, producing a rather characteristic texture through the board marks of various sizes all over the face of the building. Because of the construction method and this surface texture, at many locations the concrete covering on the reinforcement was insufficient to protect the steel. At some places, the covering was only 6 mm, causing corrosion of the rebars and, as a result, extensive spalling of concrete.

Durable remedy

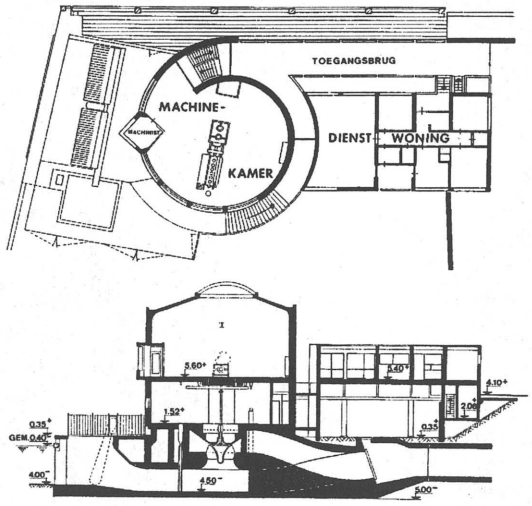
Until January 1993 regular repairs were done with epoxy based products. A drawback of this method was that the facades soon looked like a patch work. The yellow tone of the repairs did not match the original colour, and the result was not very elegant. Also, the real problem was not solved since the disease was not cured but only concealed. After some time, the disease did reappear at the surface again somewhere else. In February 1994 the Construction

Department of our office started a survey to see how the concrete envelope of the building could be renovated so as to reduce annual maintenance to a minimum. We solicited advice from Fosroc and Bouwcentrum Consultancy, and both proposed almost the same treatment:

- to blast the facades;
- to break out bad parts;
- to treat the exposed rebar;
- to repair the broken out areas (Bouwcentrum proposed a cement based mortar modified with synthetic resin, while Fosroc proposed a cement based product);
- to coat the full surface (Bouwcentrum proposed a paint coat of either poly–siloxan or an acrylic paint, while Fosroc proposed a thick silan–siloxan primer, plus a methyl–acrylatic topcoat that could be produced in most colours of the RAL–range).

Fickle appearance

The two proposals were presented on site to officers of the city's Review Committee for architecture and historic buildings ('Commissie voor Welstand en Monumenten') and a month later to some committee members themselves. Shortly afterwards, the



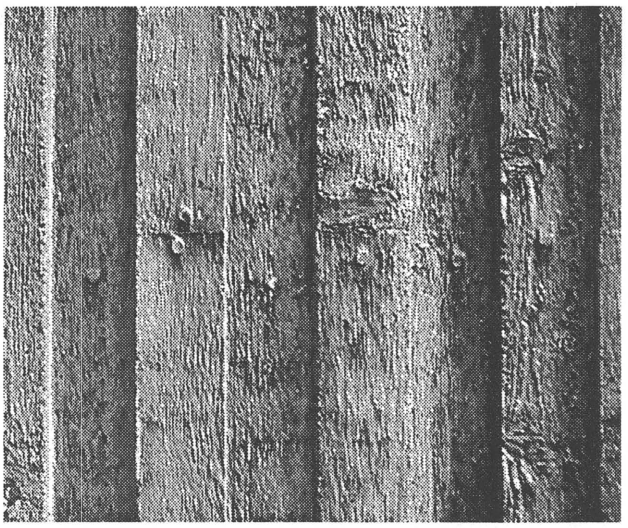
Plan and longitudinal section, showing the snail shell of the underground pump being echoed in the plan of the building. Drawings: Van der Grinten & Heijdenrijk.

committee wrote us they disapproved with the repair works as done so far. Although they realized that the treatment did comply with our technical demands, it did not meet restoration standards. In particular the colour and the texture of the repair mortar were to be taken into account. Still, the committee admitted that the building would never become 'spotless'. But they did not favour that either. Quoting from their letter we read: 'The "aged" and fickle appearance of the building is exactly what lends it its character. This character of the building is due to the special texture of the facade surfaces: the direction and relief of the poured concrete and the resulting range of textures are unique. They define the identity of the building'.

The committee underlined that the actual texture had to be preserved and carefully repaired. An even rendering, repair with shot–concrete, and the application of a coloured coating were strongly advised against. To us it seemed as if the construction failures of 1968 were now regarded as part of the architectural character of the building. Concentrations of coarse aggregates were to be respected and day joints had to remain visible. In our view, the Review Committee took the issue in a very aesthetic way, largely neglecting the very real problem of carbonation and the need for structural repair.

Invisible coatings

Fosroc's initial proposal could fully meet the committee's demands with just a few modifications, and we took that as a starting point. Their repair mortar could be slightly toned so as to conceal the marks between existing material and repairs. Through working on the freshly applied mortar, the existing texture left by the wooden boards could be reprofiled and even the uneven concentration of coarse aggregates might be remade by adding some pebbles every now and then. The full surface was then to be finished with a colourless coat Dekguard



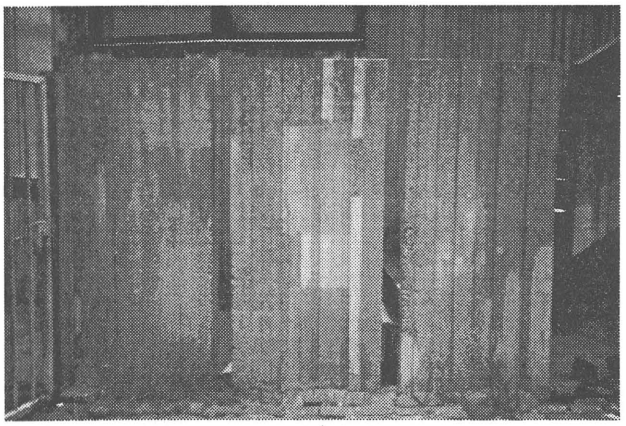
The characteristic board-marked surface of the building caused insufficient concrete covering on the rebar at many locations. Photo: Wessel de Jonge.

Topcoat Transparent. Again we consulted the committee officers about Fosroc's reworked proposal but their concern remained that the original texture would be lost. The proposed repair mortar had a grain of 1 mm aggregates, which was considered too fine to match the existing texture. Moreover, they disapproved the proposed coating system. Despite the producer's specifications for the surface as matt, the officers considered the result still too shiny. The proposed alternative, an 'anti–graffiti' coating which is supposed to be completely invisible, appeared from the specs not to solve the carbonation problems. Committee officers decided to explore other solutions with the Dutch agent for the German Keim products,

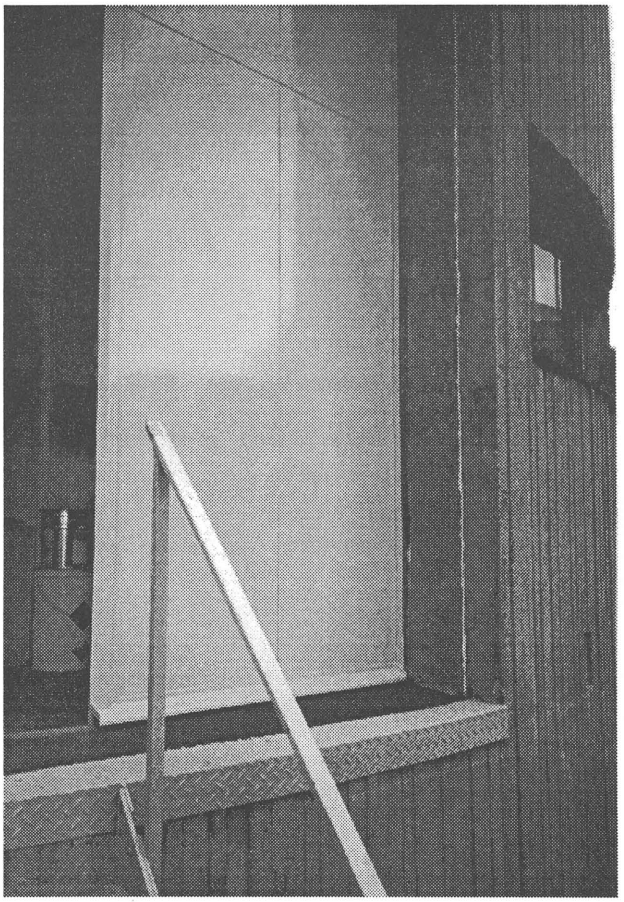
and Sigma. Neither could provide a fully transparent coating because a minimum of 20% pigments always remains – which can be an advantage since they might hide older repairs quite well. The mineral products like Keim were rejected altogether because they allow carbon dioxide through the coat and do not stop carbonation. Despite the slight colouring, the officers were positive about the Sigma products. The principle of an invisible coating seemed thereby to be abandoned, and also Sigma was invited to propose a remedial program.
Our office decided to invite a third proposal from the Dutch branch of Sika, with which we had very good experiences. Their range include a colourless coating that prevents carbonation progress. All three suppliers submitted a comprehensive proposal in terms of quality and costs. A careful evaluation learned that the quality, the guarantees and the costs of all three were roughly the same, so we asked them to put up samples on site, which they accepted to do.

Three samples

In July 1995, almost fifteen months after our first contacts, committee officers came again to see the samples. All three were turned down and they came back to their first demands: a matching mortar and a fully transparent coating. Frankly speaking, also my office and the invited firms themselves were not pleased with the samples. The story therefore continued, and the firms were offered a final chance to meet to the demands. This time, they were less enthusiastic in offering their help again.
At last, the Review Committee was satisfied with Fosroc's transparent coating, but did not approve the colour of their repair mortar. Fosroc then produced about 15 sample grouts in their labs by experimenting with various colouring additives and the company remained positive to produce the right colour still with a full technical guarantee.
Sika, on the other hand, decided not to tone their repair mortar because the authentic material on the building showed already much variety in colour. They decided that the basic colour of their mortar should do the job, in combination with a coating. Upon demand, the coating still could be pigmented –before and after treatment. Sika put up a new sample using Monotop 620, that was slightly blasted after curing, and then coated.
Sigma did not want to water down their initial proposal to level the texture with a render, that would produce an even surface. The firm considered it useless to apply an anti–carbonation agent only here and there instead of a full treatment. Their point was, that damage would re–occur on other locations in such a case.
Although they were able to match the colour of the mortar and to provide an acceptable coating, they insisted a full rendering was essential to arrest carbonation. The Review Committee could not accept this proposal because the fair face of the concrete would be fully lost. In the end, Sigma decided to propose another levelling render still suitable for patch repair, covered by a colourless coat.
All in all, the three firms met the demands made by my office. Apart from the brilliance and the carbonation–arresting effect, also the permeability was important due to the humid conditions both inside and outside the building. They all offered solutions with a breathing, anti–carbonation



Test repairs by Sigma (left), Sika (middle) and Fosroc (right) showed a potential risk of patchwork effects, similar to previous at random repairs. Photo: Koos van der Zanden.



At most locations the repairs match perfectly with the existing material. Almost one-third of the concrete next to the doorpost is renewed invisibly. Photo: Koos van der Zanden.

treatment, that came up to all regulations and guarantees.
In November 1995 we agreed with the officers on the method and products of Fosroc. The repair mortar eventually used was Renderoc HB 25, that was toned on site. Each 18 kilo bag was mixed with 200 grams Titanium White, 10 grams Yellow Oxide and 5 grams Red Oxide to match the colour of the sample area very closely. The ratio of this mixture was determined in the Fosroc laboratories.

Final compromise
However the natural variety in colour of the original concrete was so wide that it appeared unfeasible to make the exactly right colour for each patch. This was impossible both technically and financially. For this reason some patches are still visible, while others are almost invisible.
The transparent topcoat Dekguard Topcoat Transparent S was especially imported from Britain. The Dutch version of this product is slightly more brilliant as compared to the British one, which works for 40% as a hydrophobic agent that penetrates the concrete. The remaining 60% serves as a coating and the result is almost invisible.
By inviting five certified companies to tender we could still arrange a contract procedure in concurrence, despite the supplier and the repair method being specified.
To get the job properly done, it was necessary to develop a repair strategy in close cooperation between supplier and applier. In doing so, the guarantees for both the products and the application would be secured. Also, the strict demands by the Review Committee could be more effectively countered if all parties were informed accordingly.
The most economic offer was a fixed price for the complete job of Dfl. 300,000.— (V.A.T. included).
The job was done between May and July 1996, with Fosroc products as specified.
It is obvious that the interest of a Review Committee might differ from the interest of a client. This case study illustrates that we, as a client, were willing to make more than one effort to meet their demands, although not at all costs. A main problem for my office has been that the preparation period for –what seemed– a simple job extended to over two years. Still, with the applied repair system we managed to find a compromise between the technical and economical demands of the Construction Department of my office, and the aesthetical demands of the Review Committee, without disregarding quality standards in any respect.

Koos van der Zanden is with the Construction Department of the Hoogheemraadschap *water authorities of Delfland, the Netherlands. As a building manager he has been in charge of the concrete renovation of the Parksluizen pumping station. Text translated from the Dutch by the editor.*

An invisible treatment as a design brief

by Heide Hinterthür

The Parksluizen pumping station and the attendant's house, that serves as a bridge between the nearby dike and the station itself, have been designed by Van der Grinten & Heijdenrijk in 1968.
My involvement with the renovation of the pumping station dates from early 1994, as a member of the municipal Review Committee for architecture and historic buildings ('Comissie voor Welstand en Monumenten'). The committee belongs to the Building Department of the municipality of Rotterdam, and is in charge of reviewing the architectural merit of all construction works in the city, whether newly built or renovation jobs.
The pumping station and the adjoining attendant's house are entirely constructed in exposed concrete. The board marks on the concrete surface are highly specific for the architectural expression. The surfaces show great differences in profile, which is why at some locations the concrete covering on the reinforcement bars was not sufficient. The concrete surface is rather open and porous and shows many concentrations of coarse aggregates. Damp easily penetrates the walls which leads to corrosion of the reinforcement.
The building managers were fed up with the frequent maintenance the building required and wanted a final solution to this technical problem. At the same time, the owner wanted to have it refurbished, as the facades looked extremely weathered and showed many traces of patch repair. The building managers' initial proposal to coat the repaired facade either by a render or by an opaque coating in a colour of the RAL–range was backed up by piles of technical reports trying to convince our committee that there was no other option.

Brilliance and colour
Almost everyone in Rotterdam knows this building, although many think it is a church. The Parksluizen station is not only well known because of its special location, elegantly situated at the waterfront, but also because of its specific shape and architectural expression. The building is an outstanding example of late postwar modernism. The year of design, 1968, marks the end of a period in which much care was given to the texture and surface of concrete in general. Because of the technical defects, these beautifully profiled surfaces tend to disappear from the concrete design vocabulary.
In my position with the municipal committee I have

often been confronted with the aspects of concrete being vulnerable – not only in the technical sense but also from an aesthetic point of view. Again and again, exposed concrete components on buildings, such as eaves, balconies, plinths or the edges expressing floors or crosswalls, are being painted to hide the marks of repair.
Today, Portland cement is the most commonly used in the construction industry.
In repairs however, the bluegray tone of Portland cement does not match with the sandy tones of the cement that was used in the early postwar period, which was a by–product of the steel industry ('Hoogovencement').
In the majority of cases, an extensive survey to find a matching mortar, with an appropriate design of aggregate mix and colour is beyond the regular budgets. This is the prime reason why mostly standard mortars are used, resulting in contrasting patch repairs that are eventually painted away – often with poor results.
To find the right colour for a paint is one of the main problems. Generally, a bluegray colour is used instead of the gray–brown or greenish gray of the original concrete, that harmonizes naturally with the tone of other facade materials like the brickwork of the infills. Also, the even tone of paintwork is dull when compared to the typical colour gradations of the original walls.
Painting causes not only a difference in colour, but also a different texture. Often disregarded during the preparation process but hard to overlook when the work is done, is that a painted surface often remains smooth and shiny, instead of the roughness and irregularity of the original texture. The brilliance of the surface after treatment makes the production errors and irregularities much more apparent, and takes away the natural character of the concrete that once provided the right context to make such marks unobtrusive. The brilliance makes the paint coat show itself, rather than the material of the substate.

Perception of concrete

Such changes of the surface can certainly have their effect on the total composition of a facade. The contrast between painted and unpainted parts shakes the balance and, more importantly, the addition of colour can have a great impact on the environment of a building. For instance, by painting the plinth of a building the smooth and natural interrelation with the environment can be lost. The building then becomes a detached and isolated object.
Apart from technical requirements, the decision to paint concrete walls is often purely aesthetically inspired. In the postwar period concrete was a modern and beloved material, though typically rendered to hide the imperfections that resulted from shortcomings in production techniques. Today, the natural colour of concrete is commonly perceived as tame and connected with an image of a construction material.
It is obvious that, to my mind, the coating of concrete is not the first thing to do. For the renovation of the pumping station we have looked for another way. For me, this job has become a pilot project in a survey to find alternative ways and products for concrete repair.

Aesthetic requirements

The first advice the Review Committee concerned the patch repairs. These were done with an epoxy based mortar which was too smooth and fine in texture and too dull in colour. The committee proposed to redo such repairs employing a more suitable mortar.
The second advice dealt with the rough and irregular face of the facades, which is a characteristic feature of the architecture but at the same time the main cause of technical failure. Our intention was to see whether it would be possible to retain the characteristics of the surface and simultaneously reduce carbonation progress, that was caused by the high porosity of the concrete in combination with the poor covering. In aesthetical terms, the roughness of the material was considered as a positive quality. In the case of the pumping station for instance, this texture had allowed the influences of weathering to show, which adds to the beauty of the building as a whole today. Wind, rain and pollution had painted the concrete surfaces in various ways and these patterns enhance the expression of the roundness of the main volume. Any coating would have prevented further weathering in the future.
The committee's proposal was to employ a kind of stain that would be transparent and matt, with just a bit of pigments. The pigments were to hide the patches, the transparency to retain the subtle colour gradations of the original concrete, and the dimness to hide the coating itself.
All in all, the committee is very pleased with the way our proposal has been taken up, particularly regarding the absence of brilliance of the transparent coating. The committee therefore has to make a compliment to the owner of the Parksluizen pumping station for turning a purely technical treatment into a restoration job.
It has constituted a great reference that will have its impact on the rich concrete heritage of Rotterdam.

Heide Hinterthür is a partner in Topaz Architects in Delft, and formerly with the Review Committee for architecture and historic buildings in Rotterdam, the Netherlands. She has mainly been involved in material and colour consultancies for a number of buildings, and the author of several publications on the subject.

Patch repair leaves architectural integrity
The Beethoven hall of the Stuttgart Liederhalle

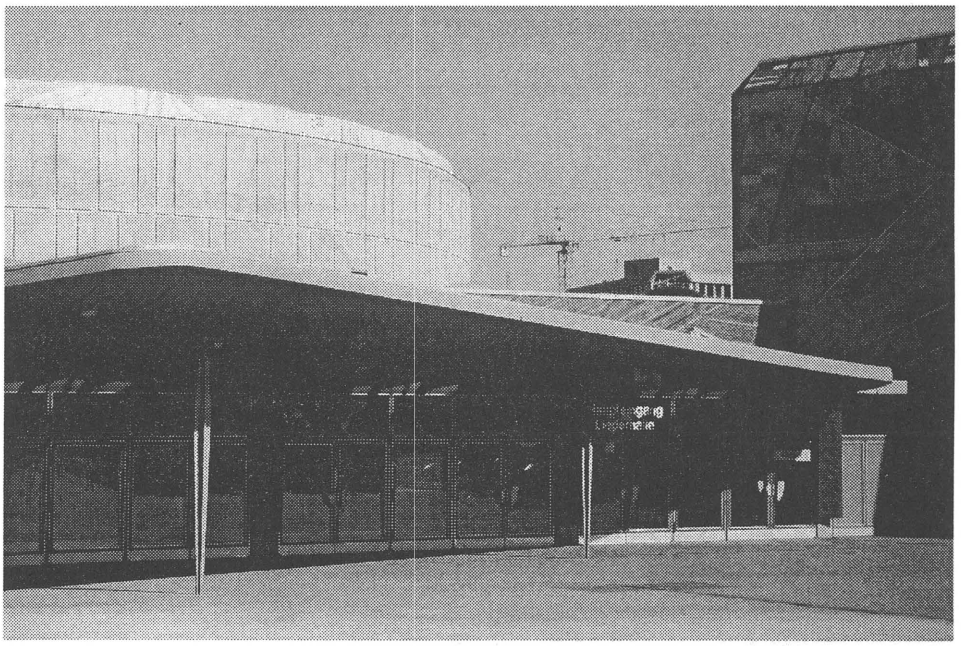
Present standards for concrete repair suggest not to limit remedial work to isolated damage spots, but advocate overall preventive measures. The common solution to apply a protective coat over the full surface of fair faced concrete facades in distress is exactly what would have destroyed the unique architectural character of the Liederhalle. The renovation of the facades of this remarkable postwar building in Stuttgart, Germany, is exemplary for careful repair of textured concrete though –or even because– the technical standards for concrete repair were not strictly met.

by Rudolf Pörtner

The general one sided alignment of most of the present concrete repair systems with the requirements of concrete technology has a history of its own. In retrospect, it were the repairs to reinforced concrete in traffic structures that resulted in a need for strict norms regarding concrete repair. The renovation of architectural heritage in reinforced concrete, however, requires more consideration than just the arguments of concrete technology. Equally important are the architectural characteristics, as well as static and constructive aspects. A few cases will illustrate this point.

In 1925, the Antonius Church in Basel, designed by the architect Karl Moser, was constructed as a fair faced concrete building. Over the last decade, all of the facades were refurbished. The intention was that the building would not look as if an even layer of mortar had been applied but rather, it was to feature a concrete surface with a visible texture of marks left by the formwork. For this reason shotcrete technology was rejected, and new concrete was applied directly to the surface. The applied materials were to satisfy the most extreme requirements in concrete technology. The concrete recipe was optimized and designed in such a way that, according to calculations, the carbonation front is to reach the reinforcement only after 500 years.

Unfortunately, the method did not come up to these expectations. Just a few years after the repairs had been done, fine cracks again made the concrete surface permeable. In view of such defects still occurring, the complete loss of the original fair faced concrete surface must be regretted even more. The only remaining authentic part of the exposed concrete facade was a recessed niche presenting the year of construction that, in a way, provided a window to



Main entrance and west facade of the Liederhalle. In the background the Beethoven hall.
All photos: Rudolf Pörtner.

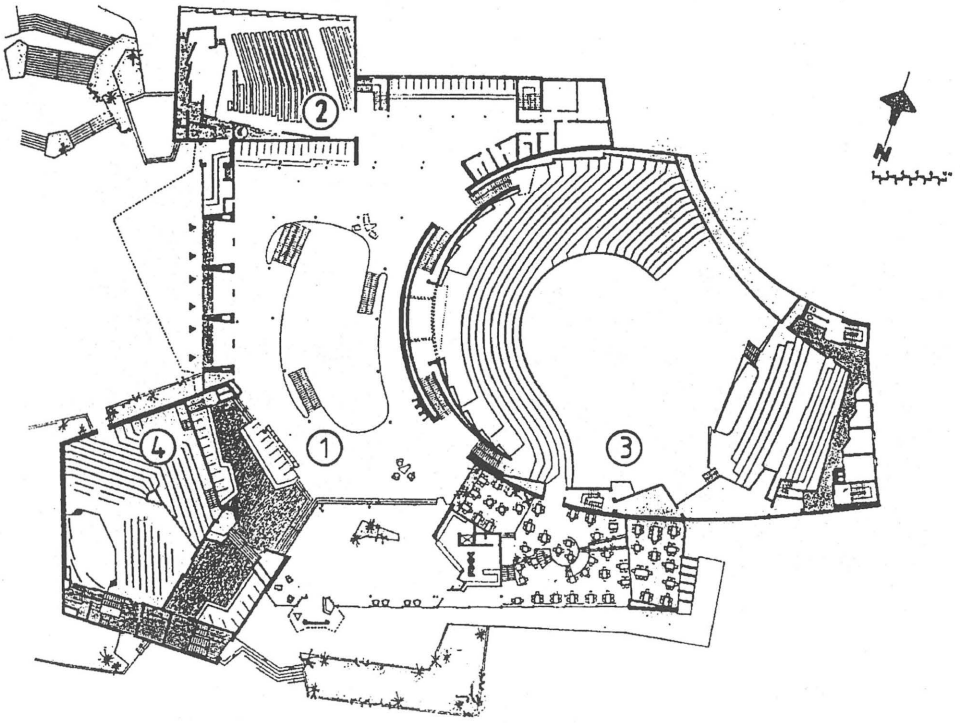
look into the past. Observing the contours of the church tower today, the once sharp edges of the tower appear as wavy lines.
The full extent of this loss can only be appreciated when comparing the original concrete facade of the Goetheanum in Dörnach, Switzerland. This remarkable building was designed by Rudolf Steiner and built in 1928. There is an obvious reason for this comparison. Initially, the intention was to apply the same principle used to restore the Antonius church in Basel to the concrete facades of the Goetheanum in order to make them 'maintenance free' for the future. In comparing the images of both buildings, two questions come to mind: how will the additional thickness of concrete alter the delicate proportions and profiles? – and how will the landscape of the existing exterior contours with sharp 'ridges' and smooth 'valleys' look after the renovation?

Principle difference

Those who are concerned with older buildings will share the experience that the most appropriate approach for restoration is often determined by evaluating similar cases, the structural system, and the causes of damage. This also applies to many iron and reinforced concrete structures.
The Feierhalle in Jena/Göswitz dates from 1906 and is characterized by an early prefabricated structure. There are supports, concrete slabs, central beams, lintels, and construction members with a specific architectural form. No reinforcing system corresponding to our current building standards has been applied, but iron straps that serve as wall anchors are tailed in following the architectural shapes of the structural components. Here, the masons have applied the tradition of constructional stone to reinforced concrete.
Another hall, in Osthofen near Worms, features girders, supports and ceiling slabs of reinforced concrete. The building, which was probably built around 1900, shows great similarity with the Hennebique system. The dimensions of structural members are unmistakably influenced by the tradition of timber construction. The model of the arched girders with straps is typical for the way such reinforcements were translated to concrete construction.
Comparing the mass of the constructional members of the Erlweinspeicher in Dresden (1926), and that of the load bearing components and space enclosing elements in the cross sections of the wind tunnel in the German Aviation Research Institute in Berlin, built in the early 1930s, shows that there is no universal recipe for the renovation of concrete heritage. However, it seems to me that common procedures for performing preliminary investigations can definitely be applied to such structures as well. There is no principle difference between assessing buildings of either reinforced concrete or historic masonry or timber structures.

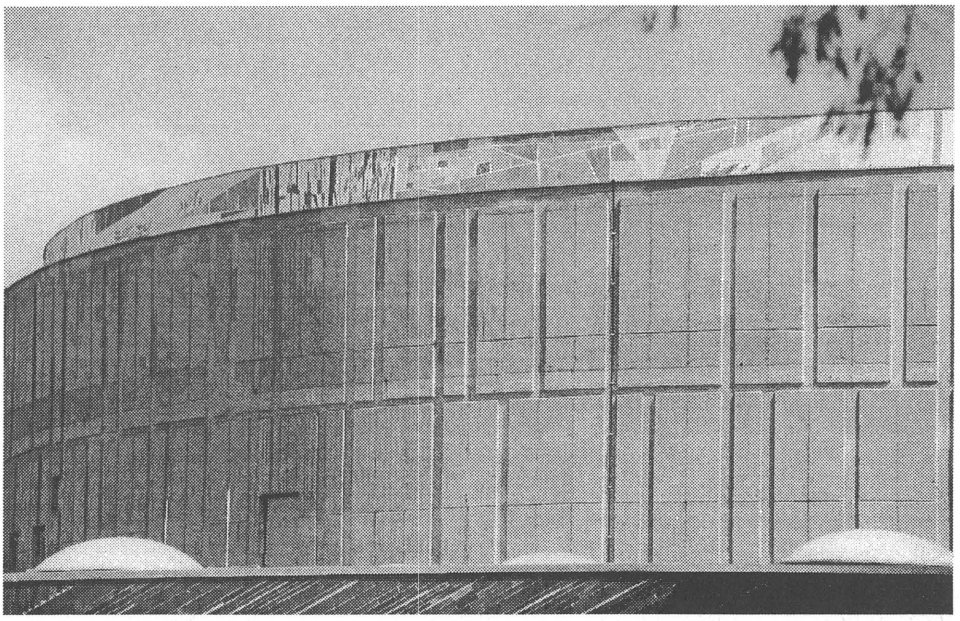
Three composers

The first Liederhalle, built in Italian renaissance style in 1863 after a design by the architect Friedrich Leins was bombed in 1943. Six years on, the City of Stuttgart announced a design competition to rebuild the concert hall. The plans by the Adolf Abel – Rolf Gutbrod team, and a design by Hans Scharoun were selected for elaboration, though, at the time, there were insufficient funds to realize neither of the



Plan showing the common foyer (1), the Silcher (2), the Beethoven (3) and Mozart halls (4).

projects. It was only in 1954 that Abel and Gutbrod were invited to make construction drawings, after which their project was eventually built between 1955-56.
In urban terms, the concert hall is characterized by the combination of a building and a park yet avoiding any axial interrelation. The architecture borrows its strength from the contrast between differentiation and combination. Facade openings contrast with the closed surface of full walls, and the interaction between man made concrete blocks and natural vegetation is equally attractive. A pattern of rectangles of various sizes is organized to create a decorative band over the concrete facades. Raised reliefs are located so as to be seen from a distance, while bas–reliefs lend a lively character to the facades at a closer range.
The building actually is composed of three halls, with a foyer and other common facilities that serve all three rooms. Developed as individual structures, the halls differ from one another in size, shape, and height. In addition, the choice of different materials results in a characteristic facade for each of the three halls. Split clinker slabs and bare concrete make up the cubic shape of the Silcher hall, which is the smallest of the three. Natural stone panels and mosaics decorate the pentagonal Mozart hall, while exposed concrete characterizes the free form of the largest of the three rooms, named after Beethoven. Elements and materials that are predominant in one hall, reoccur sparsely in the form of decorations in the other.



The curved concrete wall of the Beethoven hall with raised reliefs of rectangular patterns after reprofiling.

The face of distress

Between 1991 and 1993, all facades in the Liederhalle except the concrete facade of the Silcher hall, were renovated. At the Beethoven hall –as with most concrete structures in Germany– the damage fell into three main categories:

- the occurrence of cracks caused by shrinkage and creep of the concrete; in some locations also caused by bending due to thermal movement or as a result of differences in pourings;
- weathering by frost, wind, and rain, and the effects of aggressive environmental conditions. A relatively small but positive side effect of weathering is the concrete showing the natural colour of the aggregate when the cement is washed away;
- the main cause of damage, though, was chipping and spalling of the concrete covering. The reinforcement steel consequently started corroding causing even larger cracks in the concrete, after which the combined efforts of rust and frost expansion accelerated the damage.

From a concrete–technological and constructional perspective, concrete structures are fully manageable today. However, the basis for future shortcomings may have been layed during pourings. The right moment for pouring may be missed; too much water may have been added; out of carelessness, the concrete cover may have been too thinly applied; the formwork might have been poorly constructed; it may have been insufficiently compacted, or inadequately treated, or made during unsuitable weather conditions; and so on. Also this aspect has two sides, since often such shortcomings lend a concrete face its articulate, particular appearance.
In cases where exposed concrete has been reconstructed according to common technical standards, nothing remains of this characteristic appearance. This is exactly what happened to the facades of the Silcher hall, when these were completely coated with a chemical agent in 1986. No natural aggregate colour is visible at the Silcher hall anymore. The surface now has the appearance of icing sugar and ageing comes with no aesthetic improvement either.

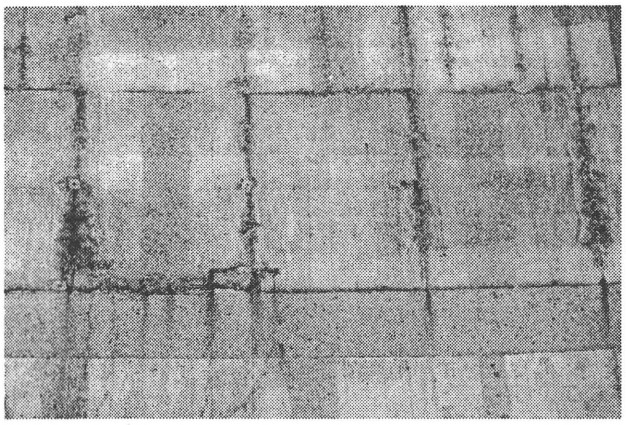
Subjective estimate

Considering the loss of original substance at the Silcher hall, and wanting to spare the Beethoven hall the same fate, the Baden–Württemberg Office for Architectural Preservation listed the building as a cultural monument. This was the situation when our office and the Institute for Solid Construction and Building Materials Technology of Karlsruhe University were called in to help.

Firstly, we reported on the condition of the building and the damage, which we considered to be an absolute prerequisite as a basis for any physical renovation measure. In the first survey of damages all concrete work was inspected, including architectural components, cracks and their widths, structural beams, areas that suffered from concrete spalling and chipping at the surface, zones where efflorescence or dripping occurred, surfaces with particular finishes such as at some of the stippled or moulded facades for example, the trumpet shaped ceramic decorations, and, off course, the reinforcement of the exposed concrete.

At the convex wall on the southwest side, damage mostly occurred in the grooves left by the formwork, as well as in the section of the 'attica'. The extent to which the damage had progressed in this area was approximately 8% of the surface concerned, though

Shortcomings of concrete lend the facade an articulate, particular appearance.



higher in some locations. Yet in the centre of the same facade the damage covered less than 1% of the surface, which was obviously a positive side effect of the wild vines that covered this part and that apparently had protected the concrete effectively.

In the first phase of the investigation, the average extent of the damage was estimated at a mere 3% of the surface. This result sharply contrasted with the impression we had after an initial visual inspection beforehand, that apparently had been a too subjective estimate.

It is very well possible that the occasional concentrations of extensive damage had made such a strong impression that the overall situation was assessed too negatively at first.

Restrained approach

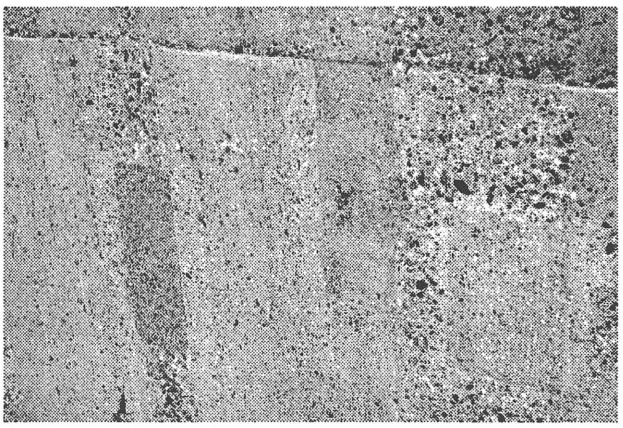
Further to the general survey, zones were determined that required a more extensive investigation of distress. A grid of metal wire on wooden battens was put over these areas in order to define smaller sections for a more precise assessment. For every section the concrete was then diagnosed referring to either of the following four categories, taking the worst conditions found in a section as a reference:

- firm and closed, which applied to approx. 76% of the area shown;
- slightly porous over approx. 10% of the area;
- small pores with efflorescence over approx. 14% of the area;
- large pores with efflorescence over less than 1% of the area.

In addition to the conditions of the surface, also the carbonation depth, the concrete covering, and the degree of corrosion of the reinforcement steel were assessed. Five levels of corrosion progress were defined to map damage to reinforcement steel:

- thin coat of rust, steel surface smooth;
- thick coat of rust, steel surface rough;
- rust 'pustules', steel surface slightly pitted;
- rust 'pustules', steel surface completely pitted;
- extensive corrosion resulting in a reduction in the cross section of steel.

Tests for matching texture and colour of repair mortars.



Remarkably, it proved to be not the steel under the firm and closed surface that was best protected, but rather the steel under the slightly porous one.

Future progress of steel corrosion can only be roughly estimated unless extensive inspection and testing of the basic environment of the concrete is performed.

At the time of the investigation, the carbonation front had reached the reinforcement in over 50 % of the surface.

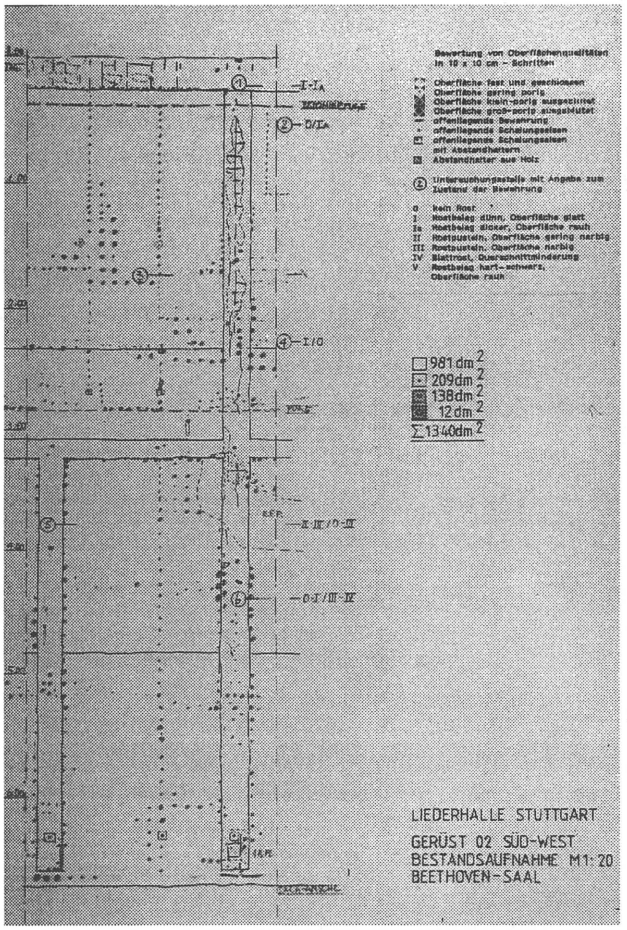
Some steel, that had been exposed ever since completion of the building due to shortcomings in construction work, on the other hand showed virtually no corrosion. Another consideration that prevents a reliable estimate of future rebar corrosion is that in the coming 20 to 30 years, the carbonation front will

only proceed extremely slowly. Damage progress will also depend on the relative humidity in the concrete, the covering, the density of the material, and the diameter of the rebars. It can be assumed that, in the coming years, there will be only isolated occurrences of damage. Instead of proposing an extensive remedial programme right away, we decided to inform the owners of the building about the limited risk and they eventually accepted the responsibility to abstain from overall preventive measures.

Craftsmen

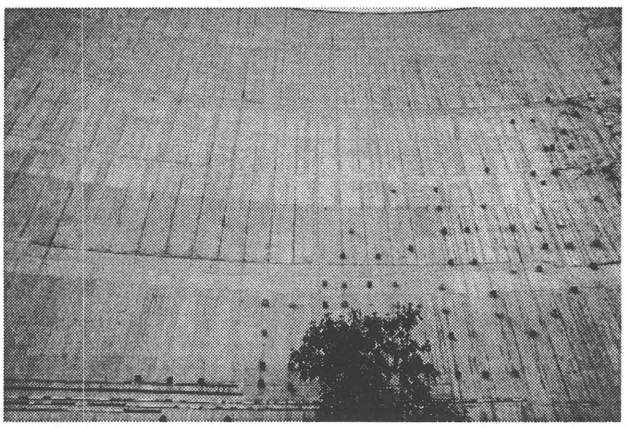
The first estimates for restoring the facades of the Liederhalle were already submitted as early as 1990. The following years, until recently, were used to perform laboratory researches as well as series of tests on site. The concrete recipes were further developed in the laboratory, and then tested regarding their suitability for concrete repair work in accordance with the technical standards. This meant tests were performed to assess concrete density and firmness, vapour diffusion, frost resistance, and working properties. In addition, colour matching was performed by testing different aggregates. It proved essential to use the same coarse aggregate as originally, but the pit from which the material was taken in 1955 had been closed in the meantime.

At selected zones, extensive investigations were performed to assess the condition of the concrete section by section.



Fortunately, the coarse aggregate from a neighbouring pit appeared sufficiently similar to match repairs with existing work.
Two companies were selected to compete for the job. One company was a certified firm of masonry craftsmen, which, at that time, had done no work on concrete. Two employees of this company, however, were very experienced with restoration work. The other company was an industrial firm with a special knowledge of reinforced concrete construction, that was experienced in repair of larger, older buildings. The contract went to the masonry firm, and we have never regretted this decision.
The restoration works were then executed according to the principle to only repair affected areas by reprofiling locally, as a premise for our intentions. Visible damages were to be repaired, but no general preventative measures were to be taken. Mere blemishes and unobtrusive stains were to be neglected. The results achieved through such repair work mainly depend on the amount of care given to the job, the level of understanding, and the level of craftsmanship of the men and women carrying out the repairs.
Another contributing factor is careful supervision of the execution, quality control both in the laboratory and on site, and strong directions regarding static

The convex wall of the Beethoven hall showing form work joints. The dots are ceramic decorations, that were repaired.



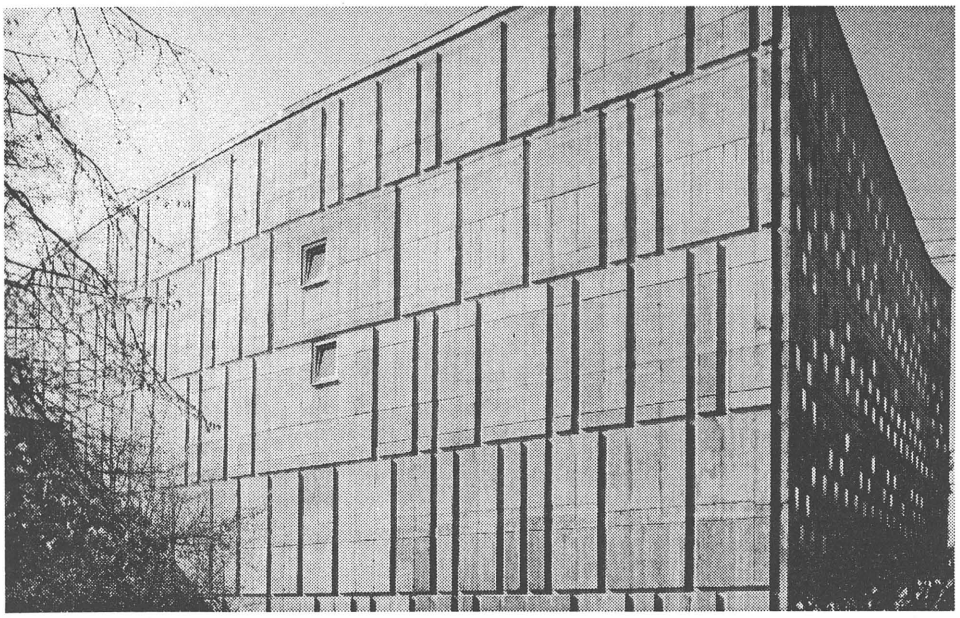
and constructive aspects as well as in architectonic and artistic terms.

Matching mortars

The works encompassed the following steps:
- the areas for repair were selected and marked;
- loose concrete was removed with careful cuts;
- to avoid concrete to detach from the substrate, mortise chisels were not used to outline the repairs but concrete at the edges of the areas to be reprofiled was removed with small chisels, while larger chisels were used in the centre;
- superfluous reinforcing steel was removed; after cleaning the remaining exposed rebar through abrasive blasting an anti-corrosive primer was

applied, blinded with quartz sand to provide an appropriate substrate;
- a cement–water mixture was then brush applied as a bonding agent;
- layer by layer, a fully mineral (non–modified) repair mortar was applied;
- after removing excess mortar while still wet, essential formwork marks were remodeled onto the surface;
- after curing, the concrete surface was dressed with droves, punches and bushhammers; the loss of material at the surface through dressing was compensated by leaving excess repair mortar when reprofiling.

The difficulty in obtaining an acceptable appearance through reprofiling can be compared to inserting a patch into an old plain coloured carpet, without being able to match the insert for colour beforehand. The first reprofiling on the west side required the colour tone to be matched by adding a mineral pigment for some parts. On a fresh cement surface, the tone is firstly determined by the grey colour of the cement, but when the cement coat has weathered away the colour of the aggregate must be taken into account as well. Furthermore, light and humidity conditions will affect the colour as long as a rich cement coat remains over the surface.
After the inspection reports were evaluated, only 4% of the facade's surface actually needed repair. In the course of the works, the colour matching of mortars became more and more reliable. This applies to the appearance in detail, as well as the overall impression of the facades.



The stout elevations of the Liederhalle after restoration.

Trumpets
On the north side, the partly deteriorated and partly missing ceramic decorations by the artists Barbara Jäger and Omi Risterer from Karlsruhe, were carefully repaired and replaced where necessary. In order to do this, it was necessary to rediscover the composition of the coloured glazings of these trumpet–shaped elements. Furthermore, the transparency of the glazings had to be redeveloped by series of baking tests to comply with current toxicological specifications.
If the costs of the restoration of the Beethoven hall is calculated per square meter of renovated surface, the cost is relatively high: around DM 8,000 to DM 10,000 per square meter. If these costs are taken over the entire area of the concrete facades, a price of DM 300 per square meter is calculated. Renovation of the entire concrete surface in accordance with current standards would not have been possible for this price.
In conclusion, the real value of the careful concrete repair at the Beethoven hall lies in the preservation of its appearance and the authenticity of this building as a cultural document. It has been decisive to restrict the works to patch repair by reprofiling only locally and with mineral materials, and to avoid overall preventive measures. This approach would not have been possible without the great deal of care given in performing the preliminary surveys. Also the close supervision on the site has been essential, as have been quality tracking and systematic control.
To my mind, the procedures that were used to perform the initial survey programme are appropriate to other cases, although the execution can never be considered to be a patent recipe. Important factors that triggered the decision to patch repair were the estimated cultural value of this landmark by the owners, the relatively small proportion of facade surfaces actually being damaged, and the employment of good, responsible craftsmen.

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