Final conferences

Objekttyp: **Group**

Zeitschrift: **IABSE reports = Rapports AIPC = IVBH Berichte**

Band (Jahr): **55 (1987)**

PDF erstellt am: **26.09.2024**

Final Conferences

Conférences finales

Schlussvorträge

Concrete Structures for the Year 2000

Structures en béton de l'an 2000

Betonbauwerke für das Jahr 2000

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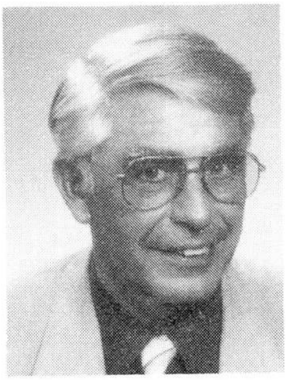

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SUMMARY
The tremendous technical development in the domain of concrete structures has too often resulted in unaesthetic constructions. Thus a compromise must be made between the economy and the integration of the structure into its environment. This report, illustrated by many examples, presents the necessity of having a good collaboration between engineers and architects, and also certain technical developments aimed directly at the economy and aesthetics. It has now become essential to satisfy the justified aspirations of the population regarding these concrete structures.

RÉSUMÉ
Le formidable essor technologique dans le domaine des structures en béton a trop souvent conduit à des réalisations inesthétiques. Il faudra donc dans l'avenir trouver des compromis entre économie et intégration des ouvrages dans leur environnement. Au travers d'exemples significatifs, cet exposé présente la nécessité d'une bonne collaboration entre ingénieurs et architectes, ainsi que certains développements techniques alliant adroitement économie et esthétique. Dès à présent, il est essentiel que les structures en béton répondent aux aspirations légitimes de la population.

ZUSAMMENFASSUNG
Der rasante technische Fortschritt mit seinen neuen Möglichkeiten besonders im Stahlbetonbau, hat oft zu aesthetisch unbefriedigenden Bauwerken geführt. Anhand von einigen Beispielen wird gezeigt wie fruchtbar die Zusammenarbeit zwischen Ingenieuren und Architekten sein kann um zu aesthetisch überzeugenden Bauwerken zu gelangen, die sich harmonisch in die Umgebung einpassen. Für die Zukunft wird es vor allem wichtig sein, der guten Gestaltung von Betonbauwerken grösste Bedeutung zuzumessen, um das Image und die Akzeptanz dieser unentbehrlichen Bauweise zu pflegen.

Fortune telling has always been a dangerous art and many a ruler had his magician beheaded when the prophesy did not please him or did not come true. In our enlightened time this risk is very small indeed, however almost everybody likes to have their fortune told, even though they do not believe in it.

Rather than to risk such a dubious prediction of what concrete structures in the year 2000 will really look like, it might be safer and more helpful to ask how we would like them to be, a task all the more imperative, where the only certainty is that concrete will remain the predominant construction material and thus decisively shape our environment.

I do not think we should close our eyes to the fact that in some highly industrialized parts of the world concrete becomes rather unpopular, and even worse it is used as a scapegoat for the malaise created in our modern society. Due to its shear bulk, the grey and raw concrete may indeed provoke uneasy feelings of soulless monotony. Many unforgivable sins committed by engineers and planners, and above all, the paranoia of some architects, have certainly contributed to the malaise sometimes associated with concrete structures.

Therefore, the aim for the future should be to cultivate as far as possible a good image and public acceptance for concrete by again creating aesthetically pleasing and technically perfect structures.

The technological and economical side of these objectives, including their promising innovations, have been extensively treated in the preceding sessions and it would be futile to plagiarize these contributions here. Therefore, the emphasis here is placed on aesthetics and the integration into the environment. These are indeed very delicate and basically subjective topics, since the "matter of taste" is very versatile.

Beautiful concrete structures have always been built, as is amply demonstrated by the two examples shown in figures 1 and 2, between which constructions there is a whole 2000 year gap: it is indeed astonishing how the ancient Romans could build such a superb concrete structure as is undoubtedly the case with the Pantheon in 27 BC, long before any theoretical tools for its design were available, and for that matter two thousand years before any symposiums on durability, serviceability, geometry control were ever held!

It is hoped that future generations will contemplate the recently completed beautiful Lotus Temple in New Delhi with the same admiration and respect, appreciating that in our technological era the sense for beauty and harmony has not been totally lost.

The same favourable appraisal of our achievement would hardly result in a comparison between the grandiose Pont du Gard (fig. 3), built in 20 BC, and an anonymously awful example of an ugly prefabricated highway bridge (fig. 4), for which aesthetics were sacrificed for mean economy.

Similar sins in engineering were and are committed almost everywhere, and unfortunately rather frequently, in spite of the fact that our enormous scientific and technological means could easily permit much better results. Certainly beauty has its price, but need not be extreme.

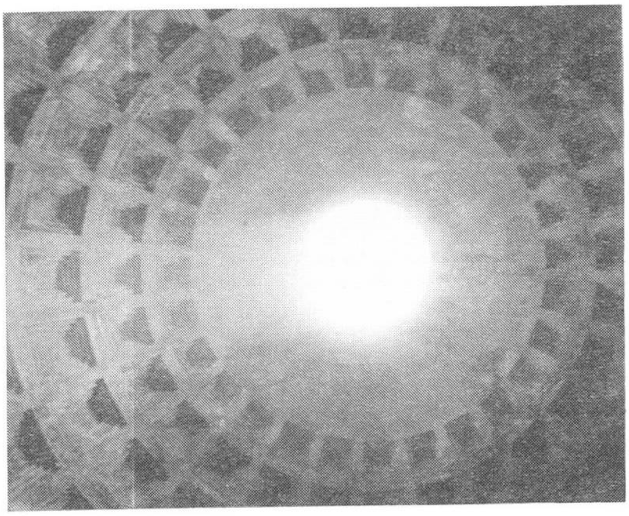

Fig. 1 - Pantheon in Rome built in 27 BC

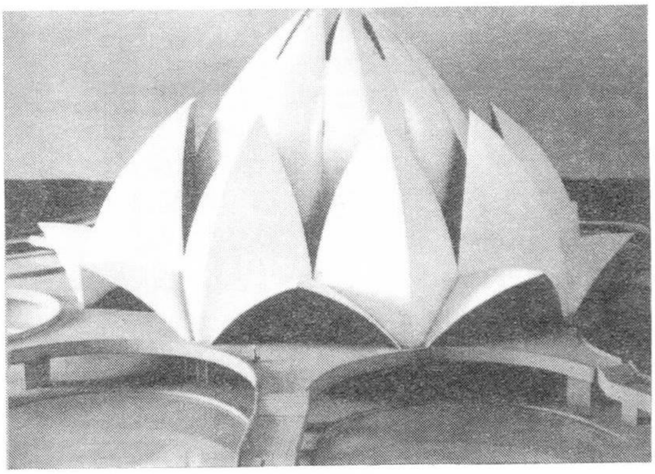

Fig. 2 - Lotus Temple, New Delhi, completed in 1986

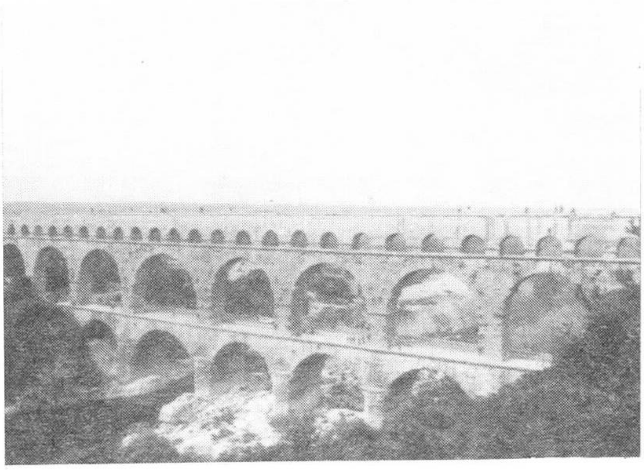

Fig. 3 - Pont du Gard (20 BC)

Fig. 4 - Monotonous prefabricated highway bridge

For future concrete structures it can only be hoped that owners will be willing to pay the little extra costs required for the aesthetic value and quality deserved. It is imperative that the bad habit of giving the work of the design and execution of the structure to the lowest bidder should be abandoned. The architectural and engineering masterpieces were certainly not carried out in this way.

One of the foremost tasks for the future will surely be the protection of our environment. The battle cry of some radical ecologists "a stop to concrete", and for that matter to all important construction projects, is absurd and can certainly not solve the pressing problems of mankind. On the other hand, it can hardly be denied that in many cases too little attention has been given to ecological desires.

Thus it could happen that such a wonderful landscape as on the shores of the Bienna lake, surrounded by picturesque fishing villages and vineyards, was all but destroyed by a modern highway (fig. 5). In the honour of our profession it may be mentioned that the highway authority engineers were vigorously opposed to this project, particularly since an ecologically and technically better solution avoiding this area was at hand. However, local politicians wanted their highway and economic benefits which would supposedly go with it.

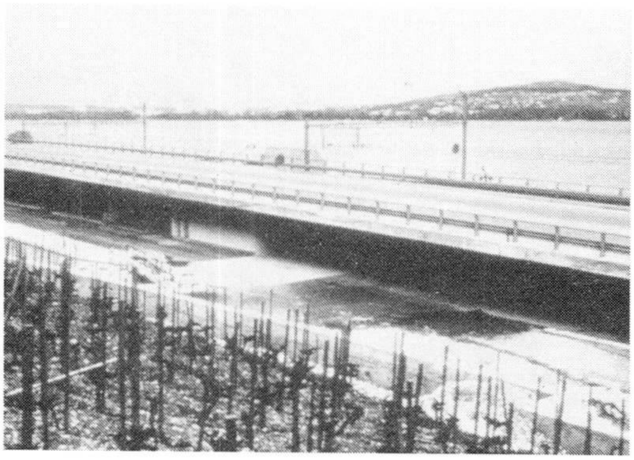

Fig. 5 - Highway on the border of the Bienna lake destroying the picturesque landscape (CH)

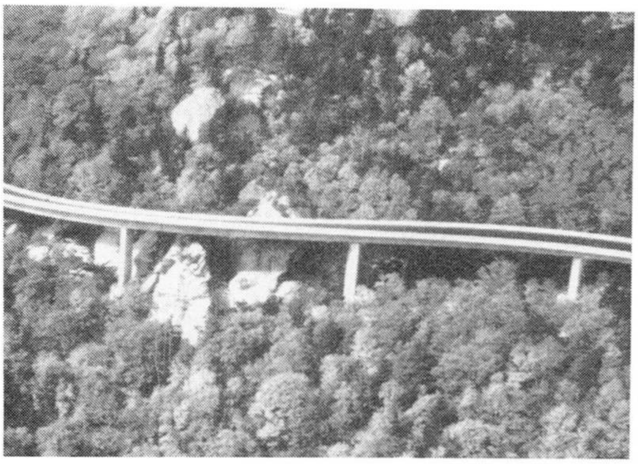

Fig. 6 - Harmonious integration of a highway in a National Park (USA)

With proper care and engineering skill, highways can be integrated harmoniously into the landscape, as was expertly demonstrated at a National Park in the USA (fig. 6). Since the steady growth of the world population inevitably requires the construction of new communications, we should at least do our best to keep the damages to nature at a minimum.

Meticulous attention has to be given to architectural aspects, even for essentially functional engineering structures. A tunnel entrance, for example, does not necessarily need to be dull (fig. 7), but may become subtly attractive (fig. 8) with help from gifted architects.

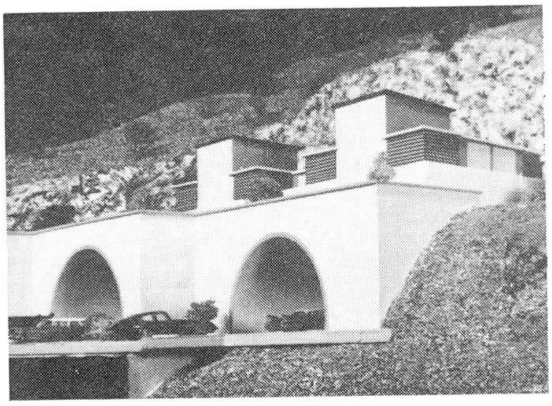

Fig. 7 - Dull tunnel entrance resulting from a purely functional design

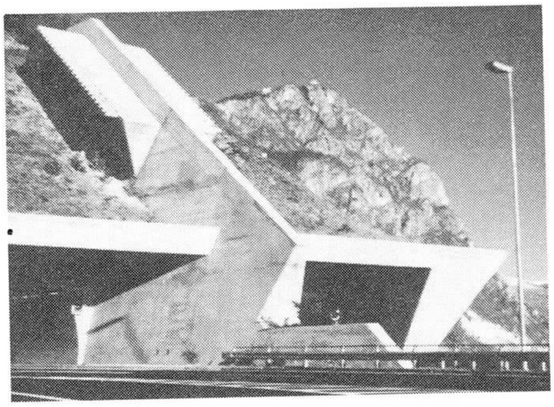

Fig. 8 - Construction of the same tunnel entrance, but attractively shaped

One lesson learned time and time again is that a lot can be gained by congenial collaboration between architects and engineers, and that the unfortunate separation of the two professions should be overcome. Admittedly this is a difficult task, since the bad habit of many architects to call upon civil engineers only to perform the analysis, dimensioning and detailing of structures, the concept of which they have already definitively determined. Conversely, many engineers shy away from consulting architects for predominantly engineering structures, since there are indeed too few of the latter, who are predisposed for a mutually helpful collaboration in this domain.

The pylon of the Hoechst Bridge (fig. 9), one of the first cable-stayed concrete bridges, is a good example of how an architect has positively helped to give this structural element an elegant shape and good proportions. The same solution for an aesthetically pleasing and interesting moulding of a pylon was observed on the Ebro Bridge in Spain (fig. 10).

In spite of the very close spacing of the cables, their collective transparency is rather astonishing, which undoubtedly makes such structures very attractive. One prediction for the future which can safely be made is that concrete cable-stayed bridges have a growing field of potential application. Due to their unquestionable elegance they can, in many cases, be harmoniously integrated into the landscape. Furthermore, recent developments and constructions have proven that they can be economically competitive, even for small and medium span ranges.

For spans up to about 250 m, the simplest and cheapest concept is to provide such bridges with slender concrete decks. The first application of this idea was carried out for the Diepoldsau Bridge over the Rhine (fig. 11 et 12).

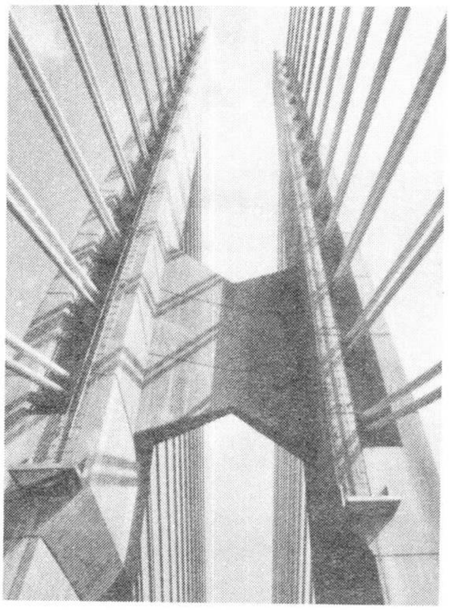

Fig. 9 - Pylon of the Hoechst Bridge over the Main

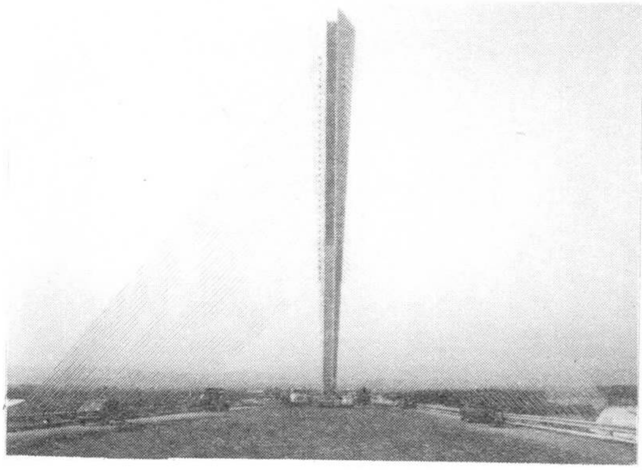

Fig. 10 - Pylon of the Ebro Bridge, Spain

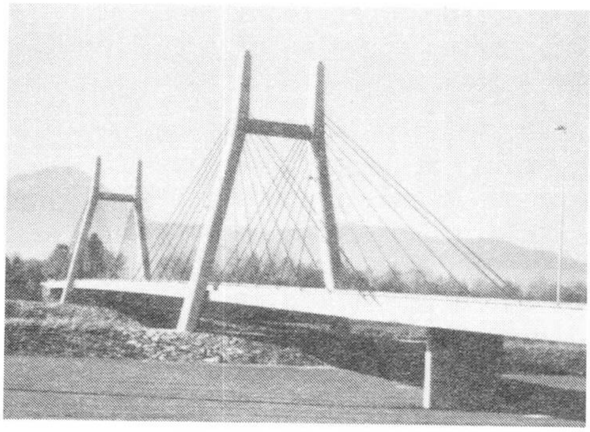

Fig. 11 - Diepoldsau Bridge over the Rhine (CH)

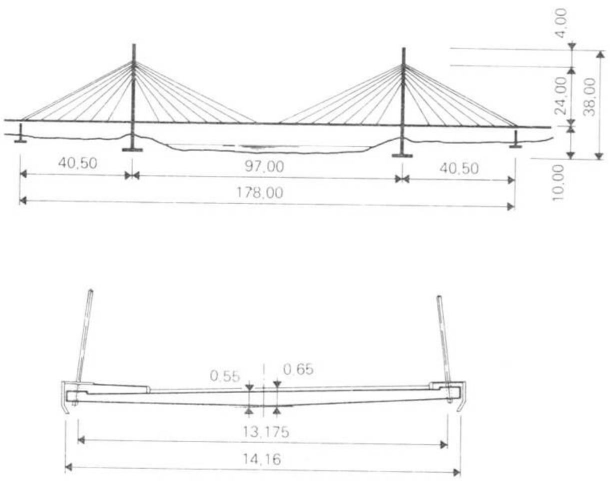

Fig. 12 - Cross-section of the Diepoldsau Bridge

In order to investigate the particular problems of this construction concept, that is mainly the static, dynamic and aerodynamic stability, tests on a large model (fig. 13) were conducted at the EPFL (Ecole Polytechnique Fédérale de Lausanne). Experimental and theoretical evidence show that static instability of the deck hardly becomes critical under normal conditions and span ranges mentioned above: buckling is prevented by the stays and by the activation of the considerable dead weight. Such bridges are also quite invulnerable with respect to the dynamic and physiological effects due to traffic loading. However, for very long or narrow bridges, the aerodynamical stability (flutter) may become a major problem, as the analysis of the La Dala Bridge in Switzerland (fig. 14) has shown. Thus it may become necessary to resort to

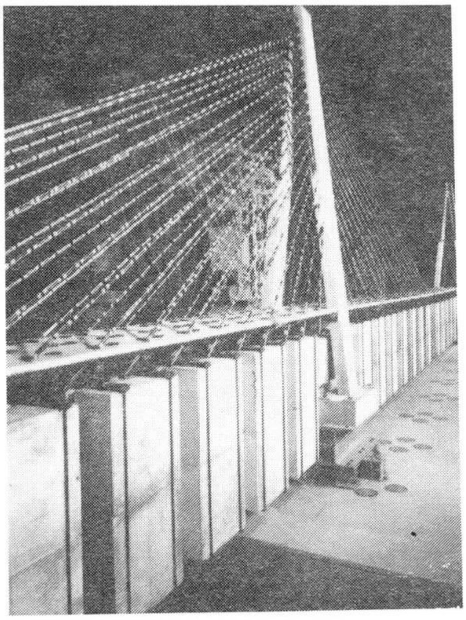

Fig. 13 - Large model test for cable-stayed bridges with slender concrete decks

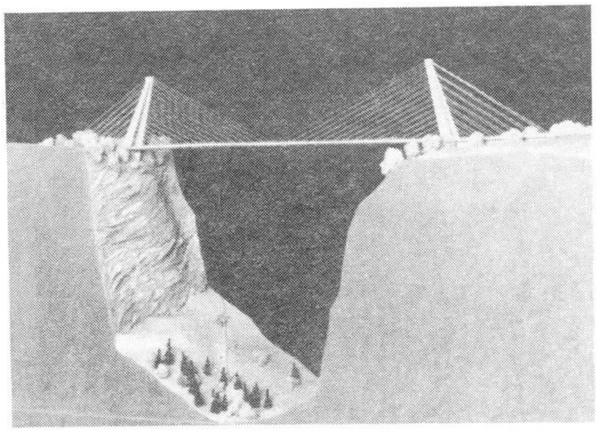

Fig. 14 - Project of the La Dala Bridge with a slender concrete deck (span 210 m)

torsionally stiff box sections, as was the case for the Barios de Luna Bridge in Spain (fig. 15 and 16) with a central span of 440 m, which is at present the world record for cable-stayed bridges with concrete decks.

Such somewhat complicated cellular decks are relatively expensive and heavy, which, especially for bridges with very long spans, constitute a serious handicap, since the cable costs become significant. On the other hand, since orthotropic steel decks cost about four times more than concrete decks, it seems evident that composite structures may be optimal for the span range of about 400 m to 800 m (fig. 17). In certain cases this type of deck can be favourable even for smaller spans, as shown by the example of the Bridge over the Rhône at St-Maurice (fig. 18).

With these examples, an emphasis was placed on the aesthetic priority, leading the way for concrete structures of the future. Many aspects of how to achieve this goal could not be elaborated here, as for example surface treatment of concrete, tinting and painting. However, there can be little doubt that only by unrelenting efforts in this direction can we meet the challenge of cultivating the image and acceptance of concrete structures for the future.

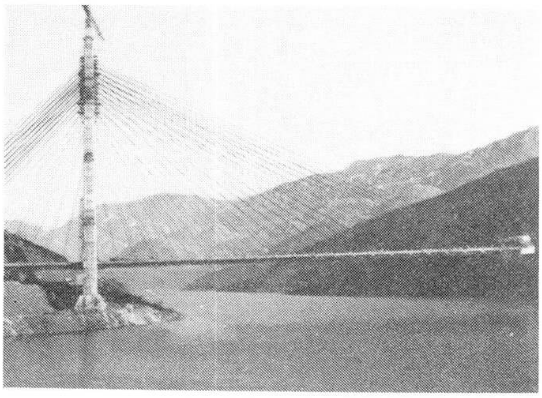

Fig. 15 - Barios de Luna Bridge in Spain

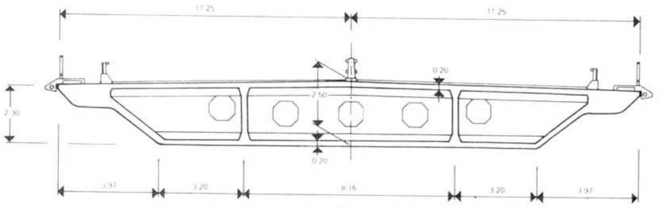

Fig. 16 - Cross-section of the Barios de Luna Bridge

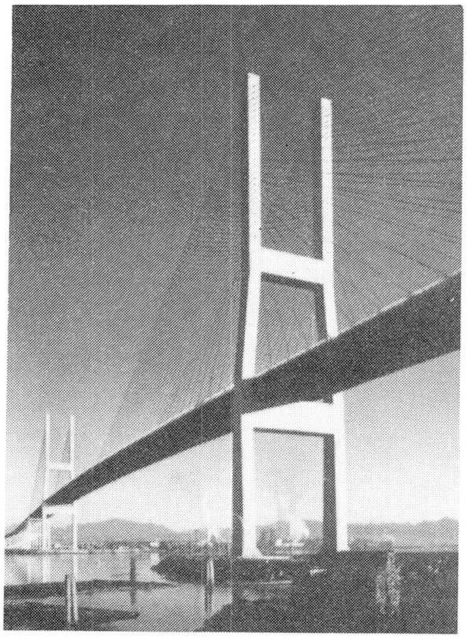

Fig. 17 - Annacis Island Bridge, Vancouver, central span 465 m, composite deck

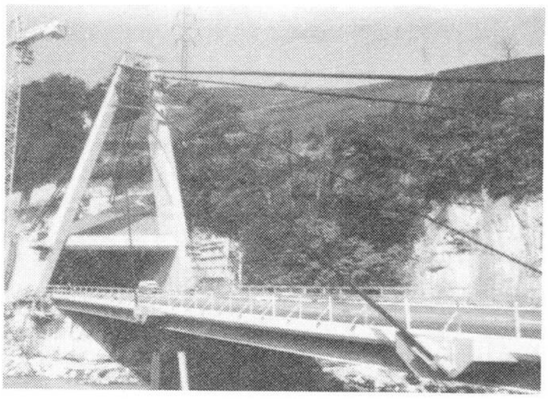

Fig. 18 - Bridge over the Rhône at St-Maurice (CH)

Concrete Structures for the Year 2000

Constructions en béton pour l'an 2000

Betonbauwerke für das Jahr 2000

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T. Tassios, born 1930, is a Professor of R. C. Structures at the Nat. Technical University, Athens, and author of several papers on concrete mechanics, especially under cyclic loading. Prof. Tassios has served as President of C.E.B. , of RILEM and of several regional and national professional Associations.

SUMMARY
Exploratory and normative forecasting of the whole field of concrete industry is briefly presented, in a rather selective way. Although it is difficult to differentiate between predictions and wishful thinking, the points made in this report may be useful for at least a better understanding of the actual situation in this sector of construction.

RÉSUMÉ
Quelques prévisions sont brièvement présentées pour l'ensemble de l'industrie du béton. Quoiqu'il soit difficile de différencier entre prévisions et évènements espérés et voulus, les vues présentées dans ce rapport peuvent être utiles au moins pour mieux comprendre la situation actuelle dans ce secteur de la construction.

ZUSAMMENFASSUNG
Ausgewählte Voraussagen über die ganze Betonindustrie werden kurz gemacht. Obwohl es schwierig ist, zwischen Voraussagen und erwünschten oder gewollten Ereignissen zu entscheiden, können die in diesem Bericht beinhalteten Einsichten von Nutzen sein, um mindestens die gegenwärtige Lage in dieser Baubranche besser zu verstehen.

1. INTRODUCTION

Needless to say that this is not a "predictive" exercise on the future of concrete structures. Besides the inability of this author to carry out such an ambitious enterprise, it has to be reminded that long-range forecasting does not seem to be very fashionable any more.
After the first energy crisis, over-sophisticated and formal techniques related to such a (partly utopistic) endeavour have yielded their place to more pragmatic short-term projects, of a more or less pluralistic and flexible character. Nevertheless, it appears that a certain effort to discern possible or desired developments may still have some merits. In fact, such an effort can usually be made along two lines: "exploratory" forecasting (starting from today's facts and trying to extrapolate towards the future), and "normative" forecasting (assessing future goals and trying to serve them accordingly). Both may be useful for the present; the first because it helps in getting a coherent understanding of the actual situation, and the second because it contributes towards defining long-range strategies. Obviously, in this respect one has to avoid technocratic temptations; the goals should only be social goals, not our own. Fortunately enough, in the specific field we are dealing with here, it is legitimate to suppose that for the next 10 years social needs are not expected to change substantially.

Under these conditions, one may try to venture a (possibilistic rather than probabilistic) assessment of some developments after a period of 10 to 15 years. Yet, what follows is not a complete list of expected or desired events but a clearly open framework, with only some selected worked-out items; it is expected that the discussion on this introductory report will drastically complete and/or modify the picture.

In doing so, I based myself on the following data:

a) the incentives offered by the topics of this very Symposium; it would be much better if I would avail myself of a full set of proceedings in advance!
b) The ACI Report "Concrete - Year 2000" published in 1971; some of its predictions are already implemented, some seem to be beyond a reasonably expected future, and others may still be set forth as feasible/desired goals.
c) The failures of some of our research projects during the past couple of decades; I maintain that a complete inventory of such failures might be very helpful in selecting some medium-range strategies, since an unfeasible target of 1975 may be a profitable exercise in 1995.

Finally, another explanation is due here. I took the term "structures" of the title of this conference in its broader sense; it would be impossible to "foresee" final structural achievements without having explored some possible developments of the means needed for their implementation. Thus, I took the liberty to speak again on trends related to materials, design construction, quality assurance, durability, innovative uses, as well as on future education and research related to concrete structures.
Regarding some humoristic mischiefs included in this report, I pray they should only be taken as a sign of my embarassment in view of the dawn of another millenium.

2. MATERIALS

2.1 Why not Reinforced Plastics instead of Reinforced Concrete?

Most of concrete's favourable properties were "copied" by modern plastic materials (mouldability, strength and versatility). Besides, modern plastics exhibit some additional very important properties, like light weight and cuttability. Of course they are also reinforced even by means of continuous fibres, and on top of all this, structures made of reinforced plastics (R.P.) lend themselves to a high degree of industrialization.
Then, what happened? Why don't we buy our structures from car dealers? Well, creep, fire-vulnerability and ill durability of plastics made their miracle: that is why concrete technology survived and flourished. However, I do not hesitate to wish that a report similar to this one would be written very soon on an optimistic long range forecasting of R.P. as well...

2.2 Cement

Among the many possibilities related to developments in the field of cement, I have selected only two characteristic visions.

a) An optimistic one: thanks to a revolutionary physicochemical process, absorbed water in cement's C-S-H will be under control, and a considerable amount of creep and shrinkage will be eliminated.
b) A pessimistic one: signs of deterioration of some R.C. structures made with some modern blended cements may lead to a reconsideration of the philosophy that "cement is the waste-basket of an affluent society".

2.3 Lightweight aggregates

Despite the deceleration of innovations in this field (due mainly to the energy crisis), a set of unbeaten incentives will lead to a considerable invigoration:

a) record spans of large bridges can be easily increased,
b) construction in difficult soils can be encouraged and
c) solutions under seismic conditions can be enhanced.

2.4 Additives

Since high strength concretes are a reality nowadays, and, on the other hand, it is not very clear how important (and wise) it would be to exaggerate in increasing strength under the actual thirst for ductility and durability, it would be perhaps more profitable to direct our brain storming towards another generation of additives; a happy interdisciplinary effort of physical, chemistry and fracture mechanics will result in the following additives (some anticipated provocative trade-names might also be thought of by now).

- "Anticarbocrete": carbonation is considerably delayed.
- "Tensocrete": higher tensile strengths and much higher extensibility of concrete is secured.
- "Self curing mass compound": water evaporation is hindered throughout the mass.

2.5 Steel

Here again, I have selected only two characteristic visions.

a) Optimistic one: Migration of iron ions towards the bar's surface and hydrogen intergranular penetration will be stopped; stress-corrosion will be practically eliminated and the application of prestressing will further expand.

b) Pessimistic one: An actual tendency to produce somewhat more brittle steels will result in some dramatic incidents, which will point to another direction of socio-economic optimisation in steel production.

3. DESIGN

3.1 Conceptual design

Like a D'Annuncio heroine, who died under the weight of thousands of roses, some new concrete structures will collapse under the weight of their automated package calculations. At this moment, the "obsolete" notion of the designer as a physical person will be re-invented, and a flexible conceptual design will be imposed as a "sine qua non" step for every project. Such a happy development is expected to take place around the year 2000, after a relevant suggestion of a super-powered central computer.

3.2 The cult of slenderness leads to annihilation!

In the multidimensional field of optimization, in the future, some slim savings in concrete consumption or some trends towards affectedly "elegant" slender members, will be rejected as highly uneconomical since they should be payed in terms of lower reliability, higher fatigue vibration risks and higher maintenance costs.

3.3 Seismic isolation

After 40 years of sterile proposals, partial failures, expensive research, pilot studies and real case-stories of behaviour during strong earthquakes, seismic isolation systems installed at the foundation level of some important structures, beside bridge piers, may be of broader application.

4. CONSTRUCTION

More than any other branch of the concrete structures industry, the construction field is open to realistic innovations.

4.1 Reinforcement cages

It is expected that a large part of the production of reinforcement will be completely automated: cutting, bending, assembling in cages, welding and labeling for transport will be made by computer-controlled large machines, used in central industry-like workshops. The expected increase of job-site fabrication costs of steel (by say 250%) up to the year 2000 will accelerate this change. Quality control will thus be equally improved.

4.2 Concrete placing, compacting and curing

Very thin precast forms (made of ferrocement of fibre reinforced mortar) in standardised dimensions will be profitably used and left permanently to become a part of the building element. Form savings, fire-protection and durability improvement are expected.

Electronically controlled vibrators will be available and able to function at a self-modified frequency, following the changing resonance frequency of fresh concrete.

Curing will be recognized as the most important concrete work, from all possible points of view (appearance, strength, durability); additional techniques will be developed and an important but separate item of payment will be established. In situ control methods resulting in early signaling of any curing defficiency will be developed.

4.3 Precasting-Prestressing

Fewer working hours per week, longer vacations and higher wages may reasonably urge the construction "industry" to turn more to its industrialisation. A vivid renewal of interest in precasting should therefore be expected, even in the buildings' sector, provided that a higher quality of finishing will be respected. One of the very probable scenaria is the production of jointless multi-room-size boxes ("megamodules"), manufactured by means of compression (or injection) moulding machines, and jointed on the site.

> It is at that moment that the big car manufacturing companies will show a greater interest in investing in the construction sector...

5. QUALITY ASSURANCE SCHEMES

5.1 Integrated joint-ventures

Although such a perspective goes far beyond the developments in the specific field of concrete structures with which we are dealing here, the search for efficiency, quality and durability points towards a "seamless" (continuum) system in the construction industry. In other words, we are bound to minimise the (eventually enormous) responsibility leakages (or quality-assurance inadequacies) which are taking place at the many interfaces between owner, programmer, designer, materials' producer, contractor, user and maintainer of a structure especially so, under the actual trend for longer and longer lifespans of our construction products. It seems therefore very profitable indeed to expand the use of an "Integrated Joint-venture" system, encompassing capital investment, conception design, materials production, construction, "lending" and maintenance of structures, all within one consortium; efficiency and quality will be just an internal matter for them. It remains, however to be seen whether the corresponding profits for the society at large may counterbalance the possible risks due to the oligopolistic nature of such schemes.

5.2 The in-situ-inspection revolution

It is really surprising to recall what a very small amount of information is included in our specimens taken from a mixer and lateron tested under compression; nothing is said about segregation, compaction and curing in-situ, about durability potentialities and so on. In the year 2000 all this (should?) have changed. Acceptance tests will be made only in situ, by means of a combined set of measurements, like:

- Immediate quality control of placed fresh concrete by means of radio-attenuation measurements; major defficiencies may lead to a direct "abmolition" of fresh concrete.
- Tensile strength measurements by means of in-situ semi-destructive methods (like "pull-out" of small diameter cylinders cut at a very small depth, or by

means of auger tests)
- Air and water permeability tests in-situ will be used as basic estimators of durability

A considerable reliability frame should be elaborated in between by pre-code makers.

6. DURABILITY

6.1 Existing structures

The alarming condition of existing structures by 2000, will impose an extensive salvation strategic plan. Important structures (and representative samples of each category, location, age etc. of smaller structures) would have been systematically assessed. According to their "state of durability", a "maintenance dossier" will be opened and kept for each of them.
A special problem will have to be faced by the year 2000; a series of fatigue failures of bridges will be produced because of the continuous increase in weight and speed of vehicles. Differential diagnosis for concrete "disintegration" (possibly due also to freezing cycles) or for steel brittle ruptures (possibly due also to corrosion embrittlement) should be made in most cases.
An intensification of research in these fields is expected within the years to come, so that we will be able to face the problem accordingly; appropriate monitoring devices will be invented and installed in due time.

6.2 New structures

The short-sighted monistic consideration of actions, being meant only as external "loads", will be totally abandoned by the year 2000. Instead, design will be carried out in a generalised space of actions including mechanical (loads and imposed deformations), physical (temperature and humidity cycles), and chemical long range influences.

Conceptual design will exclude all those pseudo-solutions which do not serve a full inspectability of all parts and a reasonable replaceability of potentially decisive structural parts.

Design for durability will take into account the characterisation of the environment, as well as the micro-environment differentiations created by the structure itself. Design solutions will formally depend on realistic expectations for maintenance. A detailed maintenance plan will be included in the design documents accordingly.

7. INNOVATIVE USES OF CONCRETE

Among the possible areas of expansion of concrete applications, I have chosen only two to comment upon.

7.1 Hazard situations

One of the most exclusive areas of concrete applications, i.e. as a shield against any kind of hazard, will be fully recognized and further widened. In fact, it is difficult to imagine any other material able to offer better protection (simultaneously) against fire or freeze, impact of explosion than reinforced concrete; even in the seismic field, reinforced concrete has recently gained over steel structures. Thus, it is reasonable to foresee e.g. a general replacement of steel guard-rails in highways by appropriate R.C. elements, the erection of external, conveniently braced precast wall systems around existing oil tanks, etc.

7.2 Marine environments

If it is true that Ocean Economy will be rapidly developing during the next couple of decades (raw materials to be extracted from both water and the bottom of the seas, energy to be captured from waves and from temperature effects within the sea, etc.), then R.C. will find one of its best fields of further applications in marine environments. Light-structures made of thin polymer-impregnated ferrocement elements will serve on the surface, while heavy spherical bodies will secure service in very large depths. Besides, it does not seem that the long expected development of floating airports has taken place as yet; however, the conditions favouring such a development are persisting. Therefore, prestressed concrete floating boxes are to be expected as the best solution for new large airports, outside congested or polluted centers on land.

8. EDUCATION AND RESEARCH

Concrete structures of the day after tomorrow will obviously be shaped by research and education of today; that is why I have thought we should devote some normative thinking to this purpose.

8.1 Education

Since "structural behaviour" of concrete is really a very large subject compared to the traditional matter of "elastic response against loads" we are mainly teaching to our students, the need is recognised to substantially shift engineering courses towards "concrete technology", as well as "control organisation".

Parallel with this, a considerable effort should be made to raise the educational level of workmen and foremen, by means of collective professional schemes. Otherwise, the gap between sophisticated tendencies in modern design and traditional attitudes in the profession, may create a dramatic threat to quality and safety.

8.2 Information

Wasted funds for useless research will be saved, and our efficiency will be greatly enhanced (especially in developing countries) when a total information transfer system will be applied. Each engineer will avail himself of all technical knowledge compiled in data banks, by merely pushing button in front of his personal computer.

8.3 Research

Practising engineers in the year 2000 will officially recognise the need for long range investment in basic research after having been (unjustly) accused for the unadvised way they left their structures under an unknown degree of carbonation or creep effects...

In the meantime, another more specific kind of research may be profitably supported: the preparation of alternative scenaria of development of this construction sector in case of possible deficiencies in energy; we may badly need them. Even if R.P. were not able to substitute R.C., the R.M. is always here to serve (R.M. standing for reinforced masonry)!

9. INSTEAD OF AN EPILOGUE

As it has been recognised in the Introduction, the development of concrete structures cannot be thought outside an overall development following the goals Society will set forth. Thus, all that has been said are but fragments of possible (but most probable) scenaria.

a) Economic conditions in general, favourable to a development of concrete structures; but we have also witnessed recessions in our field...
b) Adequate incentives to young people of higher intellectual capacity to join the sector; but the actual trends are not always optimistic...

What can we do to secure these two prerequisities of our future?
For one thing, as a curiosity at least, we may reprint and widely distribute the bestseller of Edwar Bellamy "Looking Backward: 2000-1887"; exactly one century ago, Bellamy was dreaming of the new technological society of the year 2000.