



JOURNAL OF ENGINEERING RESEARCH

V.3

MARCH

1992

The Journal of Engineering Research is Published by the Engineering Research Center Tripoli, Jamahirya

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THE "CEB MODEL CODE" AS A SOUND BASIS FOR CODES IN DEVELOPING COUNTRIES

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1.- THE Euro-International Commission of Concrete ("CEB")

As an extremely brief preamble of the subject of this paper, it seems appropriate to recall here some facts related to the European-based International Association of CEB.

The imperative need for a "synthesis of existing experience and research findings into guidance documents ready for practical use" has led several consultants, contractors and research workers from various Countries to create CEB, almost forty years ago. The Association consists of 40 National Delegations from all over the world (including Japan, China, the Soviet Union, the whole Europe, South America and Canada). Their Plenary Session, approximately every 2 years, is the highest body of the Association, its Administrative Council (headquarters in Lausanne, Switzerland) being its governing instance. The CEB technical scientific work is carried out within its nine Permanent Technical Commissions and their Task Groups, as well as within the General Task Groups working on specific interdisciplinary topics.

The series of CEB publications (the quarterly "Bulletins" consisting of 100 to 300 pages each) is devoted to State of the Art Reports, to Practical Guides and to Manuals. Sufficiently debated and calibrated new knowledge on Design of Reinforced and Prestressed Concrete Structures is gradually brought-up into a master-document called "Model Code", revised approx. every 10 years (1964, 1970, 1978, and now planned for 1990).

The National Codes of more than 20 European and south-american Countries are partly or fully based on the CEB Model Code of 1978; this is also the case with the Concrete Code (EC 2) of the European Community. Table I is an approximate assessment of such influence which, in a final analysis, is but a sort of coming-back of national efforts offered to CEB.

Table I: Influence of the CEB MODEL CODE ON NATIONAL Codes

Country	INFLUENCE		
	Strong	Moderate	Minor
Fed. Rep. of Germany			•
Belgium	•		
Danemark			•
Spain	•		
Argentina	○		
Bolivia	○		
Chile	○		
Cuba	○		
Venezuela	○		
Finland	•		
France		•	
Greece	•		
Hungary			•
Italy	•		
Norway			•
Netherlands		•	
Portugal	•		
United Kingdom		•	
Sweden			•
Switzerland		•	
Turkey		•	
Soviet Union			•
Yugoslavia		•	

2.- Prerequisites for Code-making in Developing Countries

It has to be recognised that a national Code of practice for structural design is a very important but nonetheless very particular document.

It is very important because it plays a fundamental role in ensuring public safety and public economy whereas it also serves an indirect educational purpose

for Engineers. And it is particular in the sense that a Code should clearly be differentiated from a legislative document and from a text-book. Consequently, national code-making is an extremely difficult task. Actually, even developed Countries are facing problems with code-making and they try to overcome them via international collaboration; regional Codes seem to be a more rational approach.

Nevertheless, a Code is in fact a national document observing i.a. the following qualifications:

2.1. Due to its direct impact on the economical life of the Country, a Code should be as free as possible from Clauses which/might create preferential economical dependences from a specific foreign Country.

Nowadays, very few developing Countries think of just "copying" the Code of an industrialised Country.

2.2 But, above all, a Code should reflect the national particularities on several levels.

- **Educational and technological:** Engineers and workmanship's capabilities should be pragmatically taken into account. Design or construction methods significantly more sophisticated or complicated than the average technical level of the Country, may prov to be against safety, due to higher probabilities of gross-errors.

- **Socio-economical:** As it is known, the appropriate level of safety directly depends on social priorities and the economical and technical situation in each particular Country. By way of consequence, safety factors cannot be "copied"; they should rather be adapted to these local conditions.

In order to take appropriately into account all these particularities, national Authorities should avail themselves with a technical document **explicitly** considering the corresponding parameters, such as workmanship and technological level, as well as acceptable probabilities of failure.

To this effect, in addition to a clear reliability format, the basic document should contain physically sound design-models. Otherwise, further **simplifications** are impossible since one can not know their consequences on safety.

2.3. Last but not least, a national Code should be adequately backed by available Manuals, computer programmes' lists and experts' opinions on a non-profit basis.

3.- The CEB Model Code as a basis for national Codes of developing Countries

It is not a coincidence that the CEB Model-Code meets a considerable amount of the prerequisites described in the previous chapter: The Model-Code being a product of transnational collaboration, it has to be drafted a more rational way open to national adaptations.

I maintain that this Model-Code is a sound basis for the preparation of National or Regional Codes for the design of Concrete Structures in Developing Countries.

- a) It is free from potentially preferential commercial clauses. All materials' performances are straightforwardly described, cross-referred only to International Standards.
- b) Quality control classes will be foreseen in MC90, adaptable to local conditions.
- c) A sound modelling is always used in the most possible rational way; therefore, any desired simplification may reasonably be introduced, for a particular category of structures and under clearly specified conditions.
- d) The existing MC78 is accompanied by a complete series of Manuals for practical applications; special documents are also available for fire and seismic design, compatible with the Model code. A similarly full set of practical documents is foreseen for the MC90.

Besides, the CEB is willing to assist National or Regional Code Authorities in drafting their Codes, under conditions which have to be discussed with the Administrative Council on a case by case basis.

In conclusion, I would like to observe (not without a grain of optimism) that international collaboration may be long and difficult, but it proved to be an economical and optimum solution - at least in the field of Structural Engineering.