

# Developments in the construction of reinforced and prestressed concrete structures

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## Seminar XI

**Developments in the Construction of Reinforced and Prestressed Concrete Structures**

Développements dans l'exécution de constructions en béton armé et précontraint

Entwicklungen bei der Ausführung von Stahlbeton- und Spannbetonbauwerken

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**1. Prestressed Bridges**

For prestressed bridges, it is extremely important to carefully examine the methods of construction which are often determined under the constraint of finding ways to reduce costs. Economy constitutes a favorable factor when the contract is lump sum or paid according to a schedule of prices, in which case the quantities of materials used for the completed structure and those calculated for the chosen method of construction must be separated, and this separation is very difficult to establish.

Beyond this purely economic aspect, each structure reflects, at the very least, the history of its construction. Thus, the method of construction is highly important to the performance of the structure, or its quality, long after the construction stage itself.

In my opinion, it is this aspect of construction that would be of interest to discuss among specialists. It seems to me that an examination reaching beyond habits and the demand for economy, such as the problem of the wear of materials, would be highly interesting. A discussion of this type would certainly not challenge today's methods, none of which are inherently good or bad. But a general sharing of ideas would permit us to slowly sort out the best methods, and would surely generate new concepts.

This is where the interest in a large conference lies: to examine one's own ideas after hearing the opinions of colleagues on a subject in which they also are specialized.



These sessions might include discussions on:

- 1.1 totally cast-in-place bridges, cantilever erection, mobile formwork, traditional scaffolding parallel to the shore followed by rotation and keying, etc.
- 1.2 entirely precast bridges, cantilever erection, erection by entire spans, etc.
- 1.3 combined systems, such as bridges with precast girders and a cast-in-place upper deck, with or without prestressing,
- 1.4 composite structures (steel plus prestressed concrete), having, for example, steel webs. These structures could be either precast or cast in place.

The above summary of construction methods is far from complete. However, its impact on the choice of the structure itself is evident immediately.

Other aspects which should not be neglected in the discussions include the comfort of the users of the bridge, for example, taking account of the presence of multiple joints, the geometrical quality of the wearing surface, the aesthetics or even the easy possibilities for checking and maintaining the structure.

I would like to insist on the detailed analysis of the consequences of every nature resulting from the methods of construction. It would not be worthwhile merely to give descriptions. The analytical justification of ideas or precise observations on existing structures would be much more interesting.

## 2. Other Structures

All of the above applies to large roof structures, dams, nuclear containment buildings and storage tanks.

Although the problems are not always the same, the history and the methods of construction remain engraved on the structure.

Depending on the method, the stresses or the deformations of a structure can be very different in the initial stages of its existence.

Once again, in this case, I think highly explicit discussions on these topics would be very interesting.

In conclusion, I would like to say that although today we possess very powerful tools for structural analysis, they are of limited interest if the precise state of initial stresses and deformations of the structure are unknown. Therefore, it is necessary to carefully study the consequences of every construction method.

The following questions deserve to be answered:

Are some methods of construction more certain than others?

Are some methods more favorable to the performance of structures in use?

In addition, it would be profitable to discuss the safety aspects of different methods.