Post-tensioned Concrete Floors Calculation

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ABSTRACT:

The aim of this document is the study of post tensioned concrete floors with unbonded tendons.

The first part of this work is a compendium of the existing information about this typology of concrete floors developed from a previous study of different international norms (EHE, BS 8110, ACI 318 and ACI 423), recommendations (HP9-96), manuals of design and previous works.

This first part of the document offers an historical introduction to post tensioned flat slabs, from the invention of the prestressed concrete up to the present time, passing through the first applications of this technology to the building, indicating the advantages constructive and economical that it offers. Later there is exposed the introduction of this technology on the Spanish market, doing special support to the problems that have prevented the implantation of this technology skill in our country unlike others (The United States, France, England ...) in which it goes being in use successfully for more than 40 years. Next a part of the work is dedicated to present the different types of post tensioned flat slabs existing. For it a classification of post tensioned slabs is realized attending to three criteria: the form of the slabs, the disposition in plant of the active reinforcement and the system of transmission of charges. Later there are detailed the characteristics of the materials and of the constructive elements that are in use in the execution of this type of structure. Finally, and to close this first part, there is detailed the constructive cycle of a post tensioned floor.

The second part of this project consists of the development of a computer application for the calculation of this typology of floor. This program has received the name LLOses Posteses (LLOP) and has been developed by the language Visual Basic 6. It is not based on any other developed previously why the whole used code has been written expressly for this application.

There must be understood that this one is not a closed project, but that continues opened, existing a series of perspectives that is tried to reach during the next years by means of the collaboration of diverse students. It is expected to obtain in a nearby future a program of great functionality that allows the calculation of any type of post tensioned flat slabs.

At the moment the structural typology that the program contemplates is the slab of constant thickness supported on punctual supports with a distribution anyone of active unbonded reinforcement. The program realizes the calculations from a division of flat slab in strips. It allows calculating band beams with n vains what allows to shape most of the floors. The scheme of work of this application can be summarized in two stages. In the first one there gets the information of the structure that one wants to shape. In the second, LLOP realizes all the necessary verifications. In necessary case it is possible to return to the first stage to make the opportune modifications.

To finish this summary it is necessary to indicate that in the present document a chapter has been dedicated to expose the theory on which LLOP is based to model structures and other one to the draft of a manual of functioning that allows to any potential user to obtain a control of the program in reasonable time. Finally also there has been written an example that allows verifying how one can use this application for modelling any flat slab.