

**SUMMARY** *“Evolution of the criterion of intervention with concrete in restoration of historic buildings in Spain and in Mexico”.*

*Mariana Esponda Cascajares*

*Director: José Luis González Moreno-Navarro.*

The subject of this investigation arose from observing the "invasion" that reinforced concrete presented in the restoration of historic buildings during the 20th century. Beginning in the 1950s, the use of this technique became the standard for resolving any sort of deterioration in historical constructions - a fact which radically modified their structural conception and which consequently produced a different way of approaching them.

Towards the end of the 20th Century it became apparent that restorations with reinforced concrete, which had been considered very efficient, in some cases were not passing the "test of time," showing themselves incompatible with the elements, as much because of the internal characteristics of the materials themselves as through errors in execution, due to problems with work techniques, in the quality or quantity of the material.

This thesis presents an historical overview of the evolution of reinforced concrete as a restoration technique. It is developed from two points of view: the first part is based on the formation of theoretical proposals; the second part confronts the use of reinforced concrete through analysis of a sampling of buildings restored with this material in Mexico and Spain.

One of the objectives of this study is to obtain a greater understanding of the real conditions of monuments restored with reinforced concrete by comparing basic information on the initial state of the monument before the introduction of this material, and the reasons which inspired its use and diffusion; by analyzing the criterion of intervention; and by evaluating, after approximately twenty to forty years, what the consequences of these actions have been. The obtainment of such rectifications should serve as a means to re-evaluate traditional techniques, to acquire a new understanding of restorations with reinforced concrete, and to lay the foundation for new lines of research into the proper utilization of both materials.

From this research we have reached several conclusions about three aspects of our investigation: the first, the reasons for which reinforced concrete was used beginning in the 1950s in regular restoration were an a-critical confidence, the almost complete absence of a specific theory, and the influence of methods of computer calculation. Reinforced concrete was also used in emergency situations to counteract damages following wars and earthquakes.

The second point refers to the reasons for which this material has recently begun to be rejected: due to the evidence of its lack of durability; as a consequence of its physical, chemical and mechanical incompatibility with traditional materials; as well as for its irreversibility and inauthenticity. Specifically, it has been proven that in the case of zones free of earthquakes, like Spain, mechanical incompatibility presents itself over a long-term period. On the other hand, in earthquake zones like Mexico, the introduction of these new reinforcements has substantially modified original structural behaviors due to the fact that they represent a different type of work which, by making these structures excessively rigid, makes them more vulnerable because they are incapable of absorbing seismic movements.

**SUMMARY** *“Evolution of the criterion of intervention with concrete in restoration of historic buildings in Spain and in Mexico”.*

*Mariana Esponda Cascajares*

*Director: José Luis González Moreno-Navarro.*

Lastly, the reasons for which, despite current negative evidence, reinforced concrete is continuing to be used, are: the fact that there is no precise understanding of the negative effects and/ or these negative effects are ignored; there are no easy, clear, fast or sole alternatives; there is a lack of understanding of old construction techniques; and, above all, because new understandings of this matter are neither assimilated, nor disseminated, nor transmitted.